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United States  
Department of  
Agriculture

Economics and  
Statistics  
Service

Agricultural  
Economic  
Report  
Number 469

*Series Special Reports - Balance Sheet July 1981*

# Economic Well-Being of Farms

## Third Annual Report to Congress on the Status of Family Farms

Harald R. Jensen, Thomas C. Hatch,  
David H. Harrington



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ECONOMIC WELL-BEING OF FARMS: Third Annual Report to Congress on the Status of Family Farms. By Harald R. Jensen, Thomas C. Hatch, and David H. Harrington. National Economics Division, Economics and Statistics Service, U.S. Department of Agriculture. Agricultural Economic Report No. 469.

#### ABSTRACT

A farm's economic well-being depends greatly on its tenure arrangements (ownership and rental of farm resources) and equity (proportion of assets owned debt free). Farms in the best financial condition are fully owned and debt free (usually established farms). Part-owner farms (operator owns part of the land, rents the rest, and owns all machinery and livestock) are also in good shape. The weakest farms are tenant-operated farms with little equity (usually beginning farmers) and full owner farms with 50-percent equity. The effects of size, wealth, income, and five different tenure-equity arrangements are analyzed here for 20 illustrative farms.

Keywords: Typical farms, farm income, farm wealth, tenure, equity.

## PREFACE

This is the third of the annual reports required by the Food and Agriculture Act of 1977 on the current situation in the U.S. farm sector.

This report focuses on individual farm units: how their economic well-being varies by tenure, farm size, farm type, equity levels, and changing prices for farm commodities and inputs. The approach is to examine how certain illustrative farms fared economically in 1979, a generally favorable year for farmers. Such information is crucial to portray the economic forces underlying changes in the structure of agriculture. The two previous reports on the family farm provided broad overviews of the Nation's farm sector and its subsectors. Such overviews, although necessary to understand the current status of farming, mask the variation in the economic well-being of individual farms that make up the sector. Those two reports and others that give overviews of the farm sector are listed at the end of this Preface.

The development of the illustrative farms has its basis in the Firm Enterprise Data System (FEDS) of the National Economics Division, Economics and Statistics Service (ESS), USDA. FEDS is a systematic approach for developing farm enterprise budgets, including costs of production for various farm commodities. These enterprise budgets are then expanded into whole farm systems to create farming units illustrative of types of farming systems in specific parts of the United States. For this report, 20 farming situations encompassing major types and locations of production were identified. Five tenure and equity combinations were superimposed upon these 20 farming units to create 100 illustrative farm situations. These 100 situations may not represent actual farms; but they describe realistic approximations. They are used in this report primarily to illustrate concepts important in portraying the economic well-being of the farming sector and also to suggest how economic circumstances may vary for different farm situations.

The farm situations and budgets used in this report are the initial results of an information system still under development. Limitations on data available from the U.S. Census of Agriculture and survey sources limited the representativeness of the farms in this report. Because of this, comparisons between different types and locations of farms must be made with care. As data become available from the 1978 Census of Agriculture and from surveys conducted by both ESS and the Bureau of the Census, the farm situations will be refined and expanded to allow more accurate comparison of economic performance between types of farms, commodity mixes, and geographic locations. When fully developed, the farm-level information system that ESS is building will be used to monitor

the economic climate facing farmers, assess the adjustments that farmers can make in this economic climate, and assess policies for their economic and structural impacts on farms. Future reports on the status of family farms will relate to the economic experiences of the refined set of illustrative farms. In addition, occasional reports on the refined set of farms are planned.

This report was prepared under the direction of David H. Harrington. The primary author was Harald R. Jensen, assisted by Thomas Hatch and David H. Harrington; Ted Thornton and Thomas Hatch were primarily responsible for the development of the computational model. Farm situations analyzed were developed by Dave Fawcett (Oklahoma State University), Ted Thornton, and the late P. Leo Strickland.

Some recent USDA reports that give an overview of the situation in the U.S. farm sector include:

Another Revolution in U.S. Farming? AER-441, Lyle Schertz and others, U.S. Dept. Agr., Econ. Stat. Coop. Serv., Dec. 1979.

Status of the Family Farm. Senate Committee Print 44-916, June 18, 1979.

Status of the Family Farm: Second Annual Report to the Congress, AER-434, U.S. Dept. Agr., Econ. Stat. Coop. Serv., Sept. 1979.

Structure Issues of American Agriculture, AER-438, U.S. Dept. Agr., Econ. Stat. Coop. Serv., Nov. 1979.



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## SUMMARY

Prices for farm products are only one factor that influence a farm's solvency. Two other factors, however, seem almost as important as prices in determining why some farms regularly fare better than others economically:

Tenure--owner-operated farms generally fare better than tenant-run farms and farms that are owned only partly by the operator because of the owner's potential for capital gains on landownership.

Equity--farms where the operators own the land and equipment debt free generally fare better than farms where the operator must make annual interest and principal payments on debts.

Pests, disease, low prices, poor management, and small size can hamper the productivity (and profitability) of individual farms. But tenure and equity seem to be factors that apply to farms in general.

We assessed the financial strength of 100 representative farms in 19 States for the following five combinations of ownership and equity (in order of greatest to least financial strength):

Full owners with 100-percent equity are in the best financial condition. They are usually long-established farmers who own all their land free of debt and all their machinery and livestock.

Part-owners with 67-percent equity are also financially sound. They own half the land they operate and rent the rest; they own all their machinery and livestock, but have outstanding debt equal to one-third of the value of owned assets.

Tenants with 50-percent equity are likewise in good shape financially. They rent all the land they operate but own all their machinery and livestock; they have 50-percent indebtedness on their machinery and livestock.

Full owners with 50-percent equity are in a rather weak financial condition. They represent farmers who have recently expanded or are expanding aggressively. They own all their land, equipment, and livestock, but with outstanding debts equal to half the total value of the farm. Their vulnerability is due to the large and stable cash flow they need to meet their debt repayments.

Tenants with 25-percent equity are in the weakest financial shape. They are usually beginning farmers who rent all the land they operate, own their livestock and machinery, and

have debts that amount to three-fourths of the value of their livestock and machinery.

The financial strength of farms is based on their ability to generate farm cash receipts (cash flow) to meet all farm expenses, plus provide a \$12,000 allowance for family living, plus set aside a depreciation fund to replace farm machinery and equipment. Farms that cannot meet these cash flow requirements will be unable to continue in operation in the long run and will eventually either have to forsake farming or supplement their farm income with nonfarm employment. Most small farms (annual farm receipts less than \$20,000) already receive more than half of their total income from nonfarm sources.

All but 30 representative farms were able to generate enough cash to cover all cash flow requirements. Of those, eight were able to meet their farm cash expenses and provide \$12,000 for family living, but could not set aside money to meet their depreciation. Nineteen were able to meet farm cash expenses but could not provide \$12,000 for family living; three farms were unable even to meet their cash farm expenses. The farms that did not meet those cash flow requirements included all five categories of the South Carolina beef farm and four categories of each of the following farm types: Texas peanut farm, Ohio soybean and grain farm, Minnesota corn and beef farm, and Colorado winter wheat farm.

Of the 30 farms that could not meet the cash flow requirements, only 1, the South Carolina beef farm, was a full owner with 100-percent equity. Six were part owners with 67-percent equity, 10 were full owners with 50-percent equity, 6 were tenants with 50-percent equity, and 7 were tenants with 25-percent equity.

Eight types of illustrative farms met the cash flow requirements over all five tenure and equity categories: Nebraska irrigated corn, Missouri beef and hog, Oklahoma cotton and beef, Kansas winter wheat, California rice, Mississippi cotton, Arkansas rice and soybeans, and Washington wheat.

These findings are based on USDA's "illustrative farms," computerized simulations of 100 crop and livestock farms based on real farms that produce the major commodities in the major producing States. The 100 illustrative farms consist of 20 farm types in 19 States, each farm type represented by the five tenure and equity categories. The data for the analyses come from censuses, surveys, and land grant colleges and universities. The data reflect the typical farm size and enterprise mix, yields, production costs, and returns prevailing in the States.

The specialization and commercialization (market orientation) of modern farms may make them vulnerable to a wide range of influences: export demand, input requirements and availabilities, credit availability and cost, and input and product prices. Farm cash flow, therefore, has become more important now than in earlier times, because farmers now rely more on purchased inputs (seed, fertilizer, pesticides). As a result, modern farmers may be less able to endure periods of depressed prices and low cash flow than their predecessors. Farmers with high equity are in the best position to weather periods of adverse prices.

To illustrate, changes in farm product prices drastically change the amount of equity needed to meet all cash flow requirements. For example, an owner-operated Illinois corn-soybean farm would need 66-percent equity to meet the cash flow requirements, including interest payments, with 1979 prices. With prices 10 percent lower, the operator would need 77-percent equity; with prices 10 percent higher, only 55-percent equity. As another example, the Kansas winter wheat farm requires only 16-percent equity to meet all cash flow requirements with 1979 prices. With prices 10 percent lower, 34-percent equity would be required; with prices 10 percent higher, no equity would be required--the net cash flow would cover all cash flow requirements and all interest payments.

Many farmers have improved their incomes by expanding their operations, which can, up to a point, reduce a farm's costs per unit of production. Some farms have expanded beyond the point of (theoretical) maximum production efficiency because of the opportunity to increase income even more, to defer taxes, and to realize marketing economies (higher prices for their products and lower prices for their purchased inputs) because of the volume they deal in.



# Economic Well-Being of Farms

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### INTRODUCTION

This report addresses two questions: First, how did individual farms fare financially in 1979? Second, what factors influenced the well-being of farms? The economic well-being of individual farms is examined by their tenure, size, type, equity level, and farm commodity and input prices. To do this, we identified illustrative farming operations in 20 different producing areas across the United States (fig. 1).

They are not actual farms: instead, they illustrate farm units common to specific production areas. <sup>1/</sup> They have as their enterprises major crops and livestock produced in the United States. Their economic well-being is analyzed in terms of cash income, expenditures, and wealth accumulation.

Since tenure and equity positions among farmers vary widely, income and financial positions for each illustrative farm are shown under five tenure and equity positions. The illustrative farms show the general relation between tenure and equity and the financial strength of a farm:

Full owners with 100-percent equity are in the soundest financial condition. They use no rented assets (land and equipment) and own their assets debt free. These farmers are usually established farmers.

Part owners with 67-percent equity (own half their land and all their machinery and livestock) are in sound financial condition.

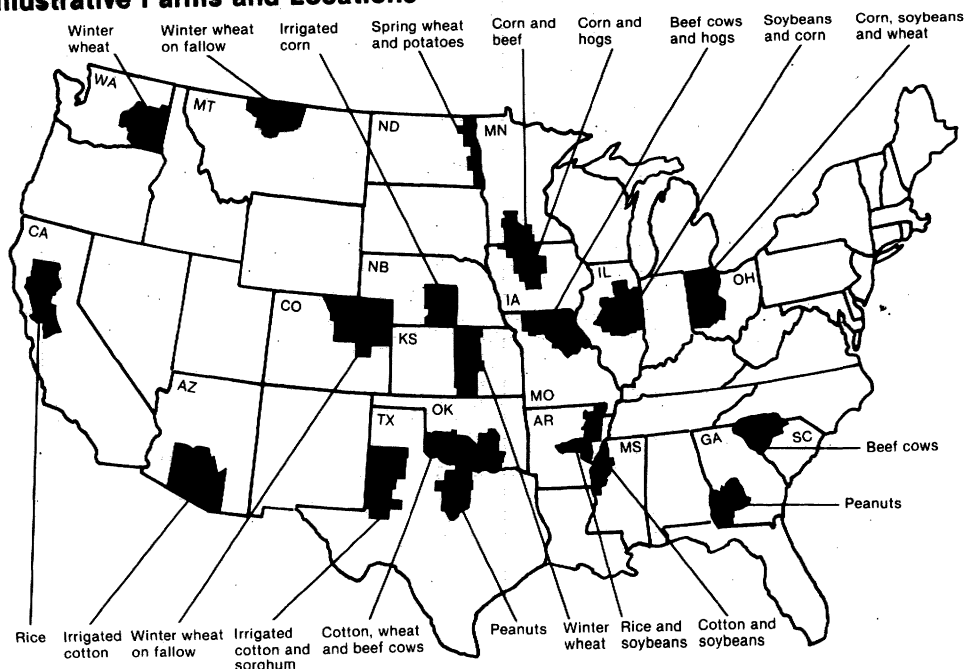
Tenants with 50-percent equity (rent all their land but own all their machinery and livestock) are likewise in very sound financial condition.

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<sup>1/</sup> These farm situations or budgets were constructed from the Firm Enterprise Data System (FEDS) in Oklahoma (see Preface).

Figure 1

**Illustrative Farms and Locations**

Source: Firm Enterprise Data System, NED, ESS, USDA.

Full owners with 50-percent equity are also in a very weak condition. They own all their land and equipment but have debts equal to half the value of their farm. These farmers are the most likely to encounter financial difficulties periodically, due to the large cash flow they need to make interest payments and to repay the mortgages on their land. These situations are typical of farms that have recently expanded, or are aggressively expanding.

Tenants with 25-percent equity are in the weakest and most vulnerable financial condition. They rent all the land they operate and most of their equipment. What they do own is highly leveraged. These farmers represent beginning farmers.

The illustrative farms can also be used to give a good indication of how a cross section of farms fared financially or can be expected to fare under different economic conditions.

We tried to avoid using too many technical terms in the report. Where we could not avoid using them, we tried to put them in a context where their meanings were clear. A small glossary is

also included at the back of the report, where some of those terms are explained further.

#### METHOD OF ANALYSIS

The FEDS budgets on which the illustrative U.S. farms and ranches are based, is a systematic approach for developing and maintaining farm enterprise budgets, including costs of production for various farm commodities. The enterprise budgets are updated annually to reflect current yields and prices in the production areas where the illustrative farms are located. Machinery complements on the illustrative farms are likewise updated periodically through farm surveys.

Farm enterprise budgets are expanded into illustrative whole farm budgets by first listing the major commodities (enterprises) produced on the farms and ranches. The States having the highest value of production for each of these commodities or enterprises are then identified. The most important producing areas for the major enterprises within these States are designated as the locations for the illustrative farms (fig. 1). Data from censuses, surveys, land grant colleges and universities, and other sources are used to select the modal (most frequent) size of the major enterprise for each of the illustrative farms and to determine the remaining characteristics of the farms. Given the farm size and enterprise mix, the enterprise budgets are then expanded to provide data on costs, labor use, machinery and equipment requirements, investment, production, and income for the farm as a whole. Acreage, gross sales of farm products, and value of farm assets (measures of farm size) describe the 20 farm situations selected for this study (table 1). Additional information on crop acreages, livestock numbers, crop yields, and labor supplies on these farms is in Appendix A.

Tenure status and financial structure, in addition to farm size, are important in describing the illustrative farms. Tenure can vary from full ownership to full tenancy, with part ownership being any combination of owned and rented assets. Financial structure is described by equity or net worth or the value of owned land and other assets in excess of the claims against them. When equity is discussed as a percentage (equity percentage or percent equity), it is net worth divided by the value of all owned assets, whether encumbered or not. Equity can vary from 100 percent (debt-free operation of the farm) to the minimum equity level acceptable to a lender--in some instances, a completely debt-financed operation.

Five tenure and equity combinations were selected to represent common financial situations on farms similar to those described in table 1:

# METHOD OF ANALYSIS

- o Full owner, 100-percent equity
- o Part owner, 67-percent equity
- o Full owner, 50-percent equity
- o Tenant, 50-percent equity
- o Tenant, 25-percent equity

One of the assumptions underlying the analysis is that the equity level for each farm situation is constant within each year. Absolute equity levels can increase from year to year due to increases in land values but, for analytical purposes, equity

Table 1--Illustrative farm situations: Acreage, annual sales, and value of farm assets, 1979

Location and type	Total : acreage	Gross annual sale : of farm products	Value of all : farm assets 1/
	Acres	Dollars	
Arizona irrigated cotton	1,440	298,996	3,459,828
Arkansas rice-soybean	850	201,497	835,851
California rice	1,200	571,269	2,603,549
Colorado wheat	3,200	82,759	1,246,995
Georgia peanut	580	129,230	600,401
Illinois corn-soybean	400	105,109	1,011,979
Iowa corn-hog	320	113,252	781,744
Kansas wheat	640	93,746	573,773
Minnesota corn-beef	320	73,883	564,814
Mississippi cotton-soybean	900	202,060	919,331
Missouri beef-hog	360	82,853	518,810
Montana wheat	3,040	115,264	1,095,701
Nebraska irrigated corn	640	128,844	995,089
N. Dakota wheat-potatoes	990	173,858	646,652
Ohio soybean-grain	240	55,488	527,762
Oklahoma cotton-beef	960	107,166	710,788
South Carolina beef	320	26,630	314,070
Texas cotton-sorghum	720	126,413	737,550
Texas peanut	600	48,642	435,483
Washington wheat	1,280	163,383	1,140,855

1/ These assets are owned or rented in different proportions by farms representing different tenure situations. The assets owned by the operator are encumbered by debt to different levels to represent different equity positions.

percentages remain constant through time. This assumption facilitates comparison of how farms with different equity levels fared during the year. In reality, equity levels grow over time as the relatively fixed amount of a land mortgage becomes a smaller percentage of increasing land values and as short-term debts are paid off. For example, the Illinois farm had a nominal increase in land value of \$87,849 in 1979--a capital gain from land. The owner-operator on this farm with 50-percent equity at the beginning of 1979 was carrying \$505,989 of debt. With the debt level remaining constant through the year, the farm's land increased in value from \$869,800 to \$957,649. The percent equity in the farm then increased from 50 percent to 54 percent during the year. In this way, a farmer's financial strength can increase over time with rising equity levels resulting from increased land values.

Throughout the remainder of this section of the report, a single farm, the Illinois corn-soybean farm, is used to illustrate the method of analysis. Of the 400 acres in the farm, 200 are in corn, 180 are in soybeans, and 20 are in farmstead, lots, and noncropland uses. The farm's assets at the beginning of 1979 were valued at \$1,011,979. Gross sales in 1979 totaled \$105,109 with \$60,103 from corn and \$45,006 from soybeans. Yields in 1979 averaged 127 bushels per acre for corn and 40 bushels per acre for soybeans. The corn was sold for \$2.37 per bushel and soybeans for \$6.33 per bushel. The operator supplied most of the labor, but supplemented it with 169 hours of family labor and 152 hours of hired labor in the planting and harvesting periods.

For the Illinois corn-soybean farm, the values of the various combinations of operator-owned assets (net worth) are:

Full owner, 100-percent equity	\$1,011,979
Part owner, 67-percent equity	\$386,643
Full owner, 50-percent equity	\$505,989
Tenant, 50-percent equity	\$60,285
Tenant, 25-percent equity	\$30,142

Accepted measures of the economic well-being of farms were applied to the 100 farm situations that were developed from the 20 farm types and the five tenure-financial situations. These measures are: net worth of the farm business, net cash farm income, and changes in farm wealth.

#### Farm Net Worth

Farm net worth is the value of farm assets minus farm liabilities. It is a measure of wealth and ultimate solvency. That is, if a farm business sells all its assets and can pay off all its debts or liabilities, it is considered to be solvent. But even if a farm is solvent at a given time, asset values can

and do change because of price changes. If prices decline, solvency can disappear over a short time, especially if solvency rests on a thin cushion, such as when the farm business has a relatively low net worth.

The net worth of an owner-operator, a part owner, or a tenant is calculated as farm assets minus farm liabilities. Percent equity for each, then, is net worth multiplied by 100 divided by the assets provided by the operator. For example, the tenant operator may provide all the machinery and equipment for a farming operation while the landlord provides all the land and buildings. A tenant who borrowed half the money needed to buy the machinery and equipment has 50-percent equity in those assets.

Net Cash Farm  
Income

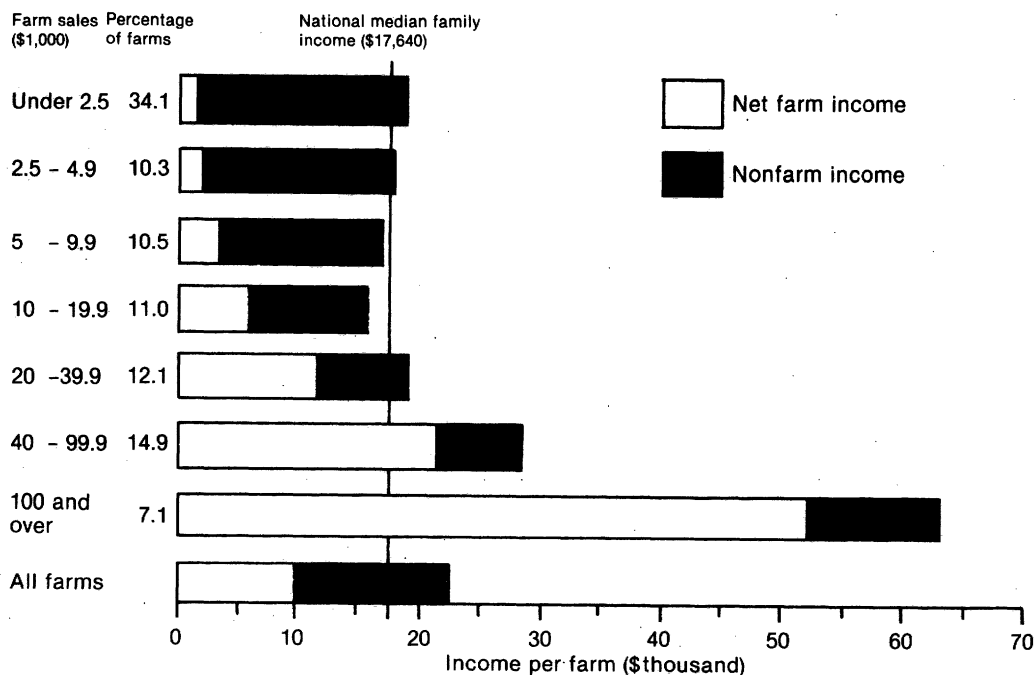
Net cash income is a measure of cash flow for the farm for the year. It tells us whether the farm's annual production, sold at prevailing product prices, was sufficient to meet the year's cash farm expenses.

Net cash income, as used in this report, does not include off-farm income and hence does not fully reflect farm family cash flows. Off-farm income is not included here because this report focuses on the economic health of the farm business, as opposed to the economic well-being of farm families. Off-farm income is, nevertheless, an important component of the economic well-being of farm families, exceeding net farm income for all sales classes below \$20,000 in 1978 (fig. 2).

Characteristic of today's farming is the large extent to which farmers rely on purchased production inputs. Given the extensive purchase of production inputs, most farmers operate with production credit. As farmers have purchased more and more production inputs (fertilizer, seed, chemicals, fuel, feed, etc.) over time, cash flow requirements for farm production have increased, which in turn has increased the need for more cash receipts. Even though farms generate enough cash receipts to pay all cash expenses, cash flow problems for the farm can still arise if the inflow of cash is insufficient to pay off an operating loan or debt as scheduled. In the spring of 1980, for example, some farmers in the Midwest encountered severe cash flow problems. The Duluth-Superior grain handler's strike, the Russian grain sales suspension, and low corn prices led to high levels of stored grain that farmers were not anxious to sell at then current relatively low corn prices. In addition, a temporarily tight money situation created a scarcity of production credit. These factors gave rise to cash flow problems.



Figure 2

**Income per Farm Family, by Farm Sales, 1978**

The need for more cash receipts has increased not only as farmers have purchased more and more farm production inputs but also as farm households have bought more and more items for family consumption. In this report, cash flow problems of three levels of severity were identified based on whether farm cash receipts can meet:

- Farm cash expenses.
- Farm cash expenses plus an allowance of \$12,000 for family living. <sup>2/</sup>

<sup>2/</sup> The \$12,000 family living allowance is considered the minimum level of expenditures necessary if the family restricted its consumption for the purpose of weathering a period of adverse prices and incomes. It falls within the range of average cash living expenses for a sample of Midwestern recordkeeping farm families, and is slightly higher than a conservative annual budget for an urban family of four for 1977-78. See Monthly Labor Review, Vol. 103, No. 1, p. 44, Jan. 1980.

- Farm cash expenses, \$12,000 for family living, plus an amount equal to the farm's annual depreciation costs on capital assets.

Simply meeting farm cash expenses draws less heavily on cash receipts than the other two levels. But if cash receipts are insufficient to cover cash expenses the operator is in extreme difficulty. However, even if cash receipts exactly cover cash expenses, the operator still has cash flow problems. In either event, the farm family would have to meet the shortfalls from past savings, off-farm income, or additional borrowing.

The second required level of cash flow draws more heavily on cash receipts than the first, since it includes a \$12,000 family living allowance in addition to farm cash expenses. Obviously, the farm family is better off than in the first instance if farm cash receipts are sufficient to meet both needs. Yet, the farm family still faces a longer term cash flow problem since it is unable to make an allowance for replacing machinery and equipment when they wear out.

The third level of required cash flow draws most heavily on the farm's cash receipts. If cash receipts can cover all the specified needs, the farm family has a stronger likelihood of staying in farming, since cash receipts then also cover replacement of wornout machinery and equipment. But even in this instance, cash flow problems may exist in the sense that no residual income remains to make principal payments on debts nor to increase the investment in the farm.

All tenure and equity combinations on the Illinois corn-soybean farm were able to meet farm cash expenses (col. 2, table 2). But the full owner with 50-percent equity, due to the high interest cost on mortgaged land, could not provide either the \$12,000 allowance for family living or the allowance for annual asset depreciation. Such an owner-operator would have cash flow problems within the year (to pay family living costs) and in the longer run (to replace machinery and equipment as they wear out). The other tenure and equity combinations could meet the cash flow needs at all three levels with a residual to make some principal payments on debts or to increase the investment in the farm.

#### Changes in Farm Wealth

The third measure of economic well-being used in this report is the change in the wealth position of the farm over the year's operation. Changes in wealth can be viewed in two ways:

- In terms of cash values at the beginning and the end of the year, that is, in nominal terms.

TABLE 2--ECONOMIC STATUS OF ILLUSTRATIVE FARM SITUATIONS FOR FIVE TENURE AND EQUITY POSITIONS, 1979

STATE, FARM TYPE, TENURE, AND PERCENT EQUITY 1/	----- DOLLARS -----											----- PERCENT -----	
	EQUITY	NET	LESS	LESS	EQUALS	DEFLATED	NOMINAL	REAL	CHANGE	RETURN TO			
	OR	CASH	FAMILY	DEPRE-	NOMINAL	RESIDUAL	CAPITAL	CAPITAL	IN	EQUITY FROM			
	NET	FARM	AND	CIATION	RESIDUAL	INCOME	GAINS 5/	GAINS	REAL	WEALTH	DEFLATED	REAL	
	WORTH 2/	INCOME 3/	OPERATOR	LABOR	TO	EQUITY	TO	AND	LOSSES 6/		RESIDUAL	CAPITAL	
					EQUITY	CAPITAL					INCOME	GAINS	
					CAPITAL	4/							
-----													
ARIZONA, IRR. COTTON:													
FULL OWNER, 100% EQUITY	3,459,828	106,722	6,425	35,805	64,491	57,965	265,733	-73,859	-15,893	2	-2		
FULL OWNER, 50% EQUITY	1,729,916	-60,208	6,425	35,805	-102,439	-92,072	265,733	-73,859	-165,931	-5	-4		
TENANT, 25% EQUITY	60,365	73,816	6,425	24,051	43,339	38,953	0	0	38,953	65	0		
TENANT, 50% EQUITY	120,731	80,396	6,425	24,051	49,919	44,867	0	0	44,867	37	0		
PART OWNER, 67% EQUITY	1,243,165	40,464	6,425	30,370	3,669	3,297	132,866	-36,929	-33,631	0	-3		
ARKANSAS, RICE-SOYBEAN:													
FULL OWNER, 100% EQUITY	835,851	103,750	8,728	18,493	76,528	68,783	131,183	51,529	120,312	8	6		
FULL OWNER, 50% EQUITY	417,925	63,804	8,728	18,493	36,581	32,879	131,183	51,529	84,408	8	12		
TENANT, 25% EQUITY	40,736	46,940	8,728	16,896	21,315	19,158	0	0	19,158	47	0		
TENANT, 50% EQUITY	81,473	51,217	8,728	16,896	25,593	23,003	0	0	23,003	28	0		
PART OWNER, 67% EQUITY	336,221	65,659	8,728	17,923	39,007	35,060	65,591	25,764	60,824	10	8		
CALIFORNIA, RICE:													
FULL OWNER, 100% EQUITY	2,603,549	320,397	17,313	22,433	280,650	252,248	635,085	335,391	587,639	10	13		
FULL OWNER, 50% EQUITY	1,301,775	194,788	17,313	22,433	155,041	139,351	635,085	335,391	474,742	11	26		
TENANT, 25% EQUITY	67,949	199,936	17,313	21,890	160,733	144,466	0	0	144,466	213	0		
TENANT, 50% EQUITY	135,898	207,342	17,313	21,890	168,139	151,123	0	0	151,123	111	0		
PART OWNER, 67% EQUITY	965,060	224,801	17,313	22,433	185,054	166,326	317,542	167,695	334,022	17	17		
COLORADO, WINTER WHEAT:													
FULL OWNER, 100% EQUITY	1,246,995	58,839	8,829	13,790	36,219	32,553	138,662	22,944	55,497	3	2		
FULL OWNER, 50% EQUITY	623,497	284	8,829	13,790	-22,335	-20,075	138,662	22,944	2,868	-3	4		
TENANT, 25% EQUITY	53,137	10,662	8,829	12,991	-11,158	-10,029	0	0	-10,029	-19	0		
TENANT, 50% EQUITY	106,274	16,294	8,829	12,991	-5,526	-4,966	0	0	-4,966	-5	0		
PART OWNER, 67% EQUITY	497,783	19,682	8,829	13,746	-2,894	-2,601	69,331	11,471	8,870	-1	2		
GEORGIA, PEANUT:													
FULL OWNER, 100% EQUITY	600,401	53,162	7,200	10,947	35,014	31,470	36,531	-8,704	22,766	5	-1		
FULL OWNER, 50% EQUITY	300,200	24,799	7,200	10,947	6,651	5,978	36,531	-8,704	-2,726	2	-3		
TENANT, 25% EQUITY	42,808	7,140	7,200	10,404	-10,464	-9,405	0	0	-9,405	-22	0		
TENANT, 50% EQUITY	85,617	11,506	7,200	10,404	-6,097	-5,480	0	0	-5,480	-6	0		
PART OWNER, 67% EQUITY	262,587	24,228	7,200	10,853	6,175	5,550	18,265	-4,352	1,198	2	-2		
ILLINOIS, CORN-SOYBEAN:													
FULL OWNER, 100% EQUITY	1,011,979	55,592	4,811	10,666	40,114	36,055	87,849	-9,064	26,990	4	-1		
FULL OWNER, 50% EQUITY	505,989	7,682	4,811	10,666	-7,795	-7,006	87,849	-9,064	-16,070	-1	-2		
TENANT, 25% EQUITY	30,142	24,597	4,811	9,283	10,502	9,439	0	0	9,439	31	0		
TENANT, 50% EQUITY	60,285	27,762	4,811	9,283	13,667	12,284	0	0	12,284	20	0		
PART OWNER, 67% EQUITY	386,643	26,384	4,811	10,666	10,906	9,802	43,924	-4,532	5,270	3	-1		
IOWA, CORN-HOG:													
FULL OWNER, 100% EQUITY	781,744	52,624	8,615	13,005	31,003	27,866	110,997	39,695	67,561	4	5		
FULL OWNER, 50% EQUITY	390,872	15,050	8,615	13,005	-6,570	-5,905	110,997	39,695	33,790	-2	10		
TENANT, 25% EQUITY	32,234	26,650	8,615	11,577	6,457	5,804	0	0	5,804	18	0		
TENANT, 50% EQUITY	64,468	30,067	8,615	11,577	9,874	8,875	0	0	8,875	14	0		
PART OWNER, 67% EQUITY	323,518	28,862	8,615	12,954	7,292	6,554	55,498	19,847	26,402	2	6		

SEE FOOTNOTES AT END OF TABLE.

CONTINUED--

TABLE 2--ECONOMIC STATUS OF ILLUSTRATIVE FARM SITUATIONS FOR FIVE TENURE AND EQUITY POSITIONS, 1979--CONTINUED

STATE, FARM TYPE, TENURE, AND PERCENT EQUITY 1/	EQUITY	NET	LESS	LESS	EQUALS	DEFLATED	NOMINAL	REAL	CHANGE	RETURN TO	
	OR	CASH	FAMILY	DEPRE-	NOMINAL	RESIDUAL	CAPITAL	CAPITAL	IN	EQUITY FROM	
	NET	FARM	AND	CIATION	RESIDUAL	INCOME	GAINS 5/	GAINS	REAL		
	WORTH 2/	INCOME 3/	OPERATOR		INCOME	TO		AND	WEALTH	DEFLATED	REAL
			LABOR		TO	EQUITY		LOSSES 6/		RESIDUAL	CAPITAL
					EQUITY	CAPITAL				INCOME	GAINS
					CAPITAL	4/					
----- DOLLARS -----											
----- PERCENT -----											
KANSAS, WINTER WHEAT:											
FULL OWNER, 100% EQUITY	573,773	68,933	8,077	11,130	49,725	44,693	64,493	17,678	62,371	8	3
FULL OWNER, 50% EQUITY	286,886	41,509	8,077	11,130	22,301	20,044	64,493	17,678	37,723	7	6
TENANT, 25% EQUITY	36,512	41,567	8,077	10,504	22,985	20,659		0	20,659	57	0
TENANT, 50% EQUITY	73,024	45,437	8,077	10,504	26,855	24,137	0	0	24,137	33	0
PART OWNER, 67% EQUITY	248,968	48,994	8,077	11,064	29,852	26,831	32,246	8,839	35,670	11	4
MINNESOTA, CORN-BEEF:											
FULL OWNER, 100% EQUITY	564,814	37,918	7,370	12,908	17,640	15,855	70,674	24,651	40,506	3	4
FULL OWNER, 50% EQUITY	282,407	11,056	7,370	12,908	-9,221	-8,288	70,674	24,651	16,362	-3	9
TENANT, 25% EQUITY	36,124	11,594	7,370	11,193	-6,969	-6,263	0	0	-6,263	-17	0
TENANT, 50% EQUITY	72,249	15,423	7,370	11,193	-3,139	-2,822	0	0	-2,822	-4	0
PART OWNER, 67% EQUITY	249,636	18,374	7,370	12,900	-1,895	-1,703	35,337	12,325	10,621	-1	5
MISSISSIPPI, COTTON:											
FULL OWNER, 100% EQUITY	919,331	118,727	6,462	24,591	87,673	78,801	117,828	40,386	119,187	9	4
FULL OWNER, 50% EQUITY	459,665	74,910	6,462	24,591	43,856	39,418	117,828	40,386	79,804	9	9
TENANT, 25% EQUITY	65,159	68,324	6,462	24,507	37,354	33,573	0	0	33,573	52	0
TENANT, 50% EQUITY	130,317	75,361	6,462	24,507	44,391	39,898	0	0	39,898	31	0
PART OWNER, 67% EQUITY	399,070	84,765	6,462	24,591	53,711	48,276	58,914	20,193	68,469	12	5
MISSOURI, BEEF-HOG:											
FULL OWNER, 100% EQUITY	518,810	50,680	6,955	10,320	33,405	30,024	59,742	21,707	51,732	6	4
FULL OWNER, 50% EQUITY	259,405	25,340	6,955	10,320	8,064	7,248	59,742	21,707	28,955	3	8
TENANT, 25% EQUITY	38,326	28,234	6,955	8,391	12,888	11,583	0	0	11,583	30	0
TENANT, 50% EQUITY	76,652	32,258	6,955	8,391	16,912	15,200	0	0	15,200	20	0
PART OWNER, 67% EQUITY	240,150	33,619	6,955	10,229	16,434	14,771	29,871	10,853	25,625	6	5
MONTANA, WINTER WHEAT:											
FULL OWNER, 100% EQUITY	1,095,701	70,755	6,936	13,327	50,492	45,382	35,138	-61,996	-16,614	4	-6
FULL OWNER, 50% EQUITY	547,850	18,779	6,936	13,327	-1,483	-1,333	35,138	-61,996	-63,330	-0	-11
TENANT, 25% EQUITY	30,442	37,851	6,936	11,981	18,933	17,017	0	0	17,017	56	0
TENANT, 50% EQUITY	60,884	41,047	6,936	11,981	22,130	19,890	0	0	19,890	33	0
PART OWNER, 67% EQUITY	424,346	38,927	6,936	13,327	18,663	16,774	17,569	-30,998	-14,223	4	-7
NEBRASKA, IRR. CORN:											
FULL OWNER, 100% EQUITY	995,089	75,129	8,845	13,096	53,187	47,805	180,575	81,082	128,887	5	8
FULL OWNER, 50% EQUITY	497,544	27,606	8,845	13,096	5,665	5,091	180,575	81,082	86,174	1	16
TENANT, 25% EQUITY	31,962	31,226	8,845	11,614	10,767	9,677	0	0	9,677	30	0
TENANT, 50% EQUITY	63,925	34,614	8,845	11,614	14,155	12,722	0	0	12,722	20	0
PART OWNER, 67% EQUITY	383,906	39,859	8,845	12,619	18,395	16,533	90,287	40,541	57,075	4	11
NORTH DAKOTA, WHEAT:											
FULL OWNER, 100% EQUITY	646,652	88,154	7,423	16,002	64,728	58,178	55,772	5,685	63,864	9	1
FULL OWNER, 50% EQUITY	323,326	57,395	7,423	16,002	33,969	30,531	55,772	5,685	36,217	9	2
TENANT, 25% EQUITY	50,668	26,600	7,423	15,568	3,608	3,243	0	0	3,243	6	0
TENANT, 50% EQUITY	101,336	31,971	7,423	15,568	8,979	8,070	0	0	8,070	8	0
PART OWNER, 67% EQUITY	286,141	51,648	7,423	16,002	28,222	25,365	27,886	2,842	28,208	9	1

SEE FOOTNOTES AT END OF TABLE.

CONTINUED--

TABLE 2--ECONOMIC STATUS OF ILLUSTRATIVE FARM SITUATIONS FOR FIVE TENURE AND EQUITY POSITIONS, 1979--CONTINUED

	EQUITY	NET	LESS	LESS	EQUALS	DEFLATED	NOMINAL	REAL	CHANGE	RETURN TO
STATE, FARM TYPE,	OR	CASH	FAMILY	DEPRE-	NOMINAL	RESIDUAL	CAPITAL	CAPITAL	IN	EQUITY FROM
TENURE, AND	NET	FARM	AND	CIAATION	RESIDUAL	INCOME	GAINS	GAINS	REAL	
PERCENT EQUITY 1/	WORTH 2/	INCOME 3/	OPERATOR:		INCOME	TO		AND	WEALTH	DEFLATED: REAL
			LABOR		TO	EQUITY		LOSSES 6/		RESIDUAL: CAPITAL
					EQUITY	CAPITAL 4/				INCOME : GAINS
					CAPITAL:	4/				
----- DOLLARS -----										
										--- PERCENT ---
OHIO, SOYBEAN-GRAIN:										
FULL OWNER, 100% EQUITY	527,762	34,449	2,708	8,469	23,271	20,916	56,711	9,683	30,599	4 2
FULL OWNER, 50% EQUITY	263,881	8,722	2,708	8,469	-2,455	-2,207	56,711	9,683	7,476	-1 4
TENANT, 25% EQUITY	27,662	9,584	2,708	7,830	-954	-857	0	0	-857	-3 0
TENANT, 50% EQUITY	55,324	12,516	2,708	7,830	1,978	1,777	0	0	1,777	3 0
PART OWNER, 67% EQUITY	216,920	15,790	2,708	8,469	4,612	4,145	28,355	4,841	8,987	2 2
OKLAHOMA, COTTON-BEEF:										
FULL OWNER, 100% EQUITY	710,788	71,844	8,701	9,158	53,984	48,521	96,575	30,308	78,829	7 4
FULL OWNER, 50% EQUITY	355,394	38,359	8,701	9,158	20,499	18,425	96,575	30,308	48,733	5 9
TENANT, 25% EQUITY	32,652	40,470	8,701	8,451	23,317	20,957	0	0	20,957	64 0
TENANT, 50% EQUITY	65,305	43,931	8,701	8,451	26,778	24,068	0	0	24,068	37 0
PART OWNER, 67% EQUITY	286,588	47,751	8,701	9,032	30,017	26,979	48,287	15,154	42,134	9 5
SOUTH CAROLINA, BEEF:										
FULL OWNER, 100% EQUITY	314,070	11,178	3,886	3,998	3,294	2,961	25,574	-330	2,630	1 0
FULL OWNER, 50% EQUITY	157,035	-3,571	3,886	3,998	-11,455	-10,296	25,574	-330	-10,626	-7 0
TENANT, 25% EQUITY	16,825	2,326	3,886	3,235	-4,795	-4,309	0	0	-4,309	-26 0
TENANT, 50% EQUITY	33,650	4,042	3,886	3,235	-3,078	-2,767	0	0	-2,767	-8 0
PART OWNER, 67% EQUITY	130,049	3,203	3,886	3,776	-4,458	-4,007	12,787	-165	-4,172	-3 0
TEXAS, COTTON-SORGHUM:										
FULL OWNER, 100% EQUITY	737,550	57,699	7,916	14,693	35,090	31,539	93,698	29,720	61,259	4 4
FULL OWNER, 50% EQUITY	368,775	23,456	7,916	14,693	847	761	93,698	29,720	30,481	0 8
TENANT, 25% EQUITY	41,496	25,830	7,916	12,126	5,788	5,202	0	0	5,202	13 0
TENANT, 50% EQUITY	82,993	30,229	7,916	12,126	10,186	9,155	0	0	9,155	11 0
PART OWNER, 67% EQUITY	305,149	34,015	7,916	13,695	12,404	11,148	46,849	14,860	26,009	4 5
TEXAS, PEANUT:										
FULL OWNER, 100% EQUITY	435,483	19,516	6,550	5,440	7,525	6,764	56,442	17,902	24,666	2 4
FULL OWNER, 50% EQUITY	217,741	-644	6,550	5,440	-12,635	-11,356	56,442	17,902	6,546	-5 8
TENANT, 25% EQUITY	21,784	4,178	6,550	4,752	-7,123	-6,402	0	0	-6,402	-29 0
TENANT, 50% EQUITY	43,569	6,487	6,550	4,752	-4,814	-4,327	0	0	-4,327	-10 0
PART OWNER, 67% EQUITY	181,902	6,757	6,550	5,389	-5,181	-4,657	28,221	8,951	4,294	-3 5
WASHINGTON, WHEAT:										
FULL OWNER, 100% EQUITY	1,140,855	107,052	7,173	20,010	79,869	71,787	105,660	3,575	75,362	6 0
FULL OWNER, 50% EQUITY	570,427	52,576	7,173	20,010	25,393	22,823	105,660	3,575	26,399	4 1
TENANT, 25% EQUITY	54,531	55,055	7,173	19,377	28,504	25,620	0	0	25,620	47 0
TENANT, 50% EQUITY	109,062	60,781	7,173	19,377	34,230	30,766	0	0	30,766	28 0
PART OWNER, 67% EQUITY	461,839	67,493	7,173	20,010	40,310	36,231	52,830	1,787	38,019	8 0

1/ A FULL OWNER OWNS ALL ASSETS; A TENANT OWNS ALL MACHINERY AND ALL LIVESTOCK; A PART OWNER OWNS HALF OF THE LAND AND ALL THE MACHINERY AND LIVESTOCK. THE PROPORTION OF IMPROVEMENTS OWNED VARIES AMONG FARM SITUATIONS BUT ALWAYS EXCEEDS FIFTY PERCENT FOR THE FULL AND PART OWNERS.

2/ EQUITY OR NET WORTH IS ASSETS MINUS LIABILITIES.

3/ NET CASH FARM INCOME IS CASH FARM RECEIPTS MINUS CASH FARM EXPENSES.

4/ DEFLATED RESIDUAL INCOME TO EQUITY CAPITAL IS NOMINAL RESIDUAL INCOME FOR 1979 ADJUSTED TO ITS BEGINNING 1979 VALUE BY A DEFLATOR EQUAL TO THE MEAN OF THE CONSUMER PRICE INDEX AND THE IMPLICIT PRICE DEFLATOR BETWEEN THE MONTHS OF NOVEMBER 1978 AND NOVEMBER 1979. NOVEMBER WAS CHOSEN TO CORRESPOND TO THE REPORTING OF LAND PRICE CHANGES.

5/ NOMINAL CAPITAL GAINS IS THE NOMINAL INCREASE IN THE VALUE OF OWNED LAND.

6/ REAL CAPITAL GAINS OR LOSSES ARE NOMINAL CAPITAL GAINS TO LAND LESS THE DECREASE IN THE REAL VALUE OF LAND DUE TO INFLATION.

- In terms of purchasing power of the assets at the beginning and end of the year, that is, in real terms, accounting for inflation in the prices of other goods.

In times of inflation, physical assets (primarily land) tend to increase in nominal value; that is, their cash value at the end of a period is greater than at the beginning of the period. Nominal capital gains on land are most important because historically they have been the largest source of increased wealth, and land resources neither wear out nor have to be replaced at inflated prices. But capital gains accrue only to the owners of assets. Hence, only farmers who are owner-operators or part owners of land receive the benefits of capital appreciation on the land they own.

On the Illinois corn-soybean farm, the nominal value of the farm's land increased by \$87,849 during 1979; thus the nominal wealth of the full owner increased by this amount. The nominal wealth of the part owner who owns half the land increased by \$43,924. Tenants owning no land received no capital gains.

Removal of the inflationary component from nominal capital gains requires that the asset values be stated in constant purchasing power at the beginning and the end of the year. Since the difference in purchasing power between the beginning and the end of the year is equal to the inflation rate for that year, real capital gains are obtained as follows:

- Add 100 percent to the inflation rate, then move the decimal point two places to the left,
- Divide the yearend value of assets by the number obtained in the preceding step,
- Subtract the value of assets at the beginning of the year from the number just obtained.

Real capital gains are realized if land values increase at a faster rate than inflation; if the inflation rate outstrips the increases in the value of the assets, real capital losses occur.

For the Illinois corn-soybean farm, the beginning value of land assets was \$869,800. The yearend value was \$957,649, which when deflated by 11.26 percent to adjust for inflation, shows that the Illinois corn-soybean farm had a real capital loss:

$$\begin{array}{rcl} \$957,649 & \div & 1.1126 = \$860,731 \\ \$860,731 & - & \$869,800 = -\$9,069 \end{array}$$



The capital loss occurred because the rate of increase in Illinois land values was slower than the national rate of inflation. Full owners must bear the full burden of real capital losses, but they also receive the full benefits from real capital gains. Real capital gains or losses accrue to part owners in proportion to their ownership of land.

Change in real farm wealth (col. 9, table 2) is a combination of returns from current income and capital gains, that is, the sum of real capital gains (col. 8, table 2) and residual income to equity capital deflated by the annual inflation rate (col. 6, table 2). Nominal residual income to equity capital is the amount of cash income left over after all other resources have been paid (in this case, family and operator labor and depreciation on capital assets). Residual real income to equity capital plus real capital gains constitute the real purchasing power that farm owner-operators have at the end of the year's business. It can be used to supplement family living (above allowances for operator and family labor) or invested off the farm and still leave the farm's capital position undiminished in real terms. Real cash and capital gains returns are ordinarily invested in the farm business. Real capital gains from land, of course, cannot be spent or invested directly unless the land is sold or refinanced.

Either or both of the components of real cash and capital gains return can be positive (gains) or negative (losses). Residual real farm income to equity capital is negative when farm cash receipts are insufficient to meet farm cash expenses plus charges for operator and family labor and for farm depreciation. The possibility of negative real capital gains has been demonstrated previously.

For the Illinois corn-soybean farm, residual real cash and capital gains returns in 1979 were:

- Full owner, 100-percent equity, \$26,991,
- Part owner, 67-percent equity, \$5,270,
- Full owner, 50-percent equity, -\$16,070 (loss),
- Tenant, 50-percent equity, \$12,284,
- Tenant, 25-percent equity, \$9,439.

Real cash and capital gains returns on the illustrative farms do not measure the full wealth position of the farm family since the measure does not include nonfarm income from off-farm investment, nor income from off-farm employment.

The rate of return on equity capital, obtained by dividing the real cash and capital gains return by net worth or equity, can be used to measure the competitiveness of farm investment with

other investments. For the Illinois farm in this example, the full owner with 100-percent equity received a rate of return of 3 percent, the full owner with 50-percent equity received a negative rate of return of 1 percent, and the part owner received a rate of return of 1 percent. The tenants received very high rates of return, 31 percent and 20 percent, on their much smaller net worths.

### Study Limitations

Most of the limitations listed below evolve from the assumptions made prior to the analysis. Some of the assumptions were necessary because of the nature of the data; other assumptions were made to isolate and study the effects of certain changes.

1. The use of fixed asset and equity structures of farms to indicate changes in economic climate from year to year has some limitations. The comparisons are designed to point out how the economic climate and weather have influenced the economic well-being of similar types of farms with similar tenure and equity from one year to another. Actual farms would be expected to adjust their crop or livestock mix and management practices, as well as to contract new debts or pay off old ones as they operate or expand their farms. But actual farms making these adjustments cannot be used to assess the changes in the economic climate from year to year; to make such comparisons requires farms of fixed sizes, enterprise mixes, and capital structures.

2. Farmers experience month-to-month cash flow problems as well as year to year, but the available data do not provide sufficient detail for analyzing such short-term problems.

3. To isolate farm production influences on economic well-being, we assumed a uniform marketing strategy for all farms. All production is sold the year it is produced at the average area price prevailing in the analysis year. Marketing strategies--grain storage, hedging on futures markets, and timing of sales--vary widely from farm to farm, but such information is not available to determine a typical marketing strategy for each illustrative farm.

4. Land and capital items are listed at their values as of January 1 of the analysis year. Machinery and equipment are assumed to be 3 and 4 years old, respectively.

5. A single level of management is assumed for each farm in the analysis.

6. The analysis is limited to showing farm financial status, not family financial status. Off-farm income is not included in the analysis. To fully describe the economic well-being of farm families we would need to look not only at

the net worth of the farm business but also at the net worth of the farm family; we would need to look not only at real capital gains and losses from farming but also at gains and losses from all farm family business ventures; and we would need to look not only at net farm income but also at the total income of the farm family. The data for such comparisons are not currently available.

THE ECONOMIC WELL-BEING OF THE FARM SECTOR

The farm sector on January 1, 1979, was in a strong financial position as measured by equity and debt-to-asset ratios. The value of farm assets totaled \$820.2 billion, up \$107.2 billion (15 percent) from a year earlier. Farm debt outstanding totaled \$137.5 billion, up \$18.2 billion (15 percent) from a year earlier. The equity of farm proprietors in the farm assets under their control totaled \$682 billion, up \$89 billion (15 percent) from a year earlier. Farm proprietors owned 83 percent of the assets they controlled.

But the equity position at current value does not give the complete picture of the wealth position of agriculture. The effects of inflation must be taken into account. If gains remain after adjusting for inflation (real gains), then the real wealth position (the purchasing power) of agriculture has increased. For several years, the current dollar values of farm assets, especially land, have been increasing. In the 12 years from January 1, 1967, to January 1, 1979, the total value of farm assets increased from \$274.2 billion to \$820.2 billion. Thus from the beginning of 1967 to the beginning of 1979 the value of farm assets increased by \$546 billion or 199 percent. Some of this increase reflects inflation in the general price level. The 1979 value of farm assets deflated to the purchasing power of 1967 dollars amounts to \$291.4 billion, a real gain of only \$17.2 billion or 6 percent. Thus over the last several years the wealth position of the farm sector has improved through capital gains, but much less than is initially apparent. This rising value of farm assets has, of course, enhanced farmers' borrowing strength.

Net farm income is another indicator of the economic well-being of the farm sector. It provides information on whether farm resources are generating enough cash to maintain the business physical plant and to provide a return to farm operators and their families.

Net farm income was \$31 billion in 1979, compared with \$26.1 billion in 1978, \$17.8 billion in 1977, and \$18.7 billion in 1976. Net farm incomes through 1976 declined from the atypical high in 1973, causing cash flow problems for many farmers. In addition, the aggregate income figures include net changes in

farm inventories (not received in cash): -\$2.4 billion in 1976, \$600 million in 1977, \$400 million in 1978, and \$4.1 billion in 1979. Thus, cash receipts available for meeting production expenses were somewhat less than indicated by net farm income figures for 1977, 1978, and 1979, and somewhat greater than indicated in 1976.

The aggregate net farm income figures mask the variation in income within the farm sector. This variation in financial health will become apparent in the discussion of the 20 illustrative farms later in this report. Large variations in farm earnings are of particular concern to the segment of the farming population that depends entirely on farming for family living. For those farmers, small changes in commodity prices often mean much larger changes in farm earnings and hence family living. Farm families with off-farm earnings, on the other hand, may be able to obtain more stable cash flows and hence more stable family earnings.

Off-farm earnings are of particular importance to farm families who gross less than \$20,000 annually from the sale of farm commodities. An additional indication of the significance of off-farm earnings as a component of economic well-being is suggested by the fact that for all farm operator families as a group, off-farm income exceeded net farm income in 10 of the last 12 years.

#### THE ECONOMIC WELL-BEING OF ILLUSTRATIVE FARMS

The measures of economic health of the illustrative farms--equity position, net cash farm income, and percent return to equity capital--are shown in table 2. The table has been developed to show how tenure, percent equity, prices for farm products and farm inputs, along with crop and livestock yields, influence the economic well-being of the farm types located across the United States.

#### Farm Net Worth

Equity or net worth varies considerably from one farm to another (col. 1, table 2). This variation reflects not only differences in the sizes of the farms but also the varying equity percentages specified in this analysis.

For example, variation in net worth due to differences in farm size can be shown by comparing the \$314,000 net worth on the small owner-operated South Carolina beef farm with the \$2.6 million net worth on the large California rice farm; owners of both farms have full equity in the farms. The variations in net worth due to the differences in the equity percentages are illustrated in the Nebraska corn farm: \$32,000 net worth for a tenant with 25-percent equity compared with the \$995,000 net worth on the same farm when operated by a full owner with

100-percent equity. But given the equity levels assumed in this analysis, all the farm businesses are ultimately solvent.

Table 2 illustrates farm situations with varying levels of financial strength reflected in the wide range of equity percentages used. Financial strength declines as equity levels decrease from full owners with 100-percent equity, to part owners with 67-percent, to owners and tenants with 50-percent, to tenants with only 25-percent equity.

Net Cash Farm  
Income

Cash flow problems are identified by whether farm cash receipts can meet the following (least stringent to most stringent):

- o Cash farm expenses.
- o Cash farm expenses plus \$12,000 for family living.
- o Cash farm expenses, \$12,000 for family living, plus an amount equal to annual farm asset depreciation cost.

All the farm situations with full ownership and full equity (table 2) had more than enough cash farm income to meet the year's cash farm expenses. But the amount of cash remaining varied considerably: from \$11,000 on the South Carolina beef farm (whose size, given the enterprise combination, was smaller than the size necessary to keep an owner-operator fully employed) to \$320,000 on the California rice farm. Thus, some farms, because of an inadequate resource base, unfavorable weather, and plant or animal diseases, have little income remaining after paying cash farm expenses for family living expenses and replacement of machinery and equipment, unless off-farm income is available. 3/

The demand for additional land comes largely from full owners with full or high equity, particularly those with high net cash farm incomes, who are in high income tax brackets. Income tax deductions for interest paid and investment credits on new machinery and specialized structures provide incentives to operators to increase their farm size to avoid paying taxes on current income. In recent years these inducements have been augmented by expectations of increases in land values and by the

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3/ Only 8 percent of U.S. farms have farming as the only source of income. Other sources are wages and salaries (making up 68 percent of off-farm income in 1975), nonfarm self-employment, interest and dividends, social security, and public assistance. See Farm Structure--A Historical Perspective on Changes in the Number and Size of Farms, U.S. Senate, Committee on Agriculture, Nutrition, and Forestry, 95th Congress, 2nd Session, 1980, p. 29.

belief that land investment is a good hedge against inflation. Thus, the unequal distribution of incomes within the farming sector gives some operators stronger bidding power in the land market than others. This contributes to increases in farm size and declines in farm numbers. The tax structure, inflation, and increasing land prices provide similar incentives to farmers and nonfarmers alike, and high net cash incomes provide established farmers the means to invest in farm expansion.

As farm equity declines, especially in those instances where land is relatively heavily encumbered, farm cash flow problems frequently occur (table 3). Three of the 20 illustrative farm situations (the Texas peanut, South Carolina beef, and Arizona irrigated cotton farms) with full ownership and 50-percent equity in assets experienced cash flow problems in the sense that annual cash receipts were inadequate to meet cash farm expenses.

Land ordinarily earns an annual return of 3 to 4 percent. Hence, cash flow problems can easily emerge when a high proportion of the land (half or more, for example) is mortgaged at a 9-percent interest rate, and the farmer encounters high farm production costs or real estate taxes--conditions (singly or in combination) observed on these three farms in 1979. But a

Table 3--Number of illustrative farms with cash flow problems by tenure and equity position, 1979

	: Full owner,	: Full owner,	: Tenant,	: Tenant,	: Part owner,	:
Cash flow problems	: 100% equity	: 50% equity	: 25% equity	: 50% equity	: 67% equity	: Total
Unable to meet farm cash expenses	0	3	0	0	0	3
Unable to meet farm cash expenses and \$12,000 for family living	1	7	6	3	2	19
Unable to meet farm cash expenses plus \$12,000 for family living and farm depreciation costs	1	10	7	6	6	30



50-percent level of indebtedness need not necessarily lead to cash flow problems, as evidenced by the 17 farm situations with 50-percent equity that had positive net cash farm incomes. Nevertheless, this level of encumbrance, when combined with less than ideal production conditions, does raise the chances of cash flow problems, particularly when the encumbrance includes the relatively large input of land.

When the illustrative farms were subjected to a more stringent cash flow requirement, namely that the farm's cash receipts must meet not only the farm's cash expenses but also \$12,000 for family living, then more of the 100 farm situations had cash flow problems. Nineteen of the 100 farm situations were unable to provide this amount of cash from the farm (table 3). It is clear from the table that cash flow problems are related to the farmer's percent equity; that is, most of the cash flow problems are on farms with low equity. Seven of the 20 owner-operated farms with 50-percent equity had cash flow problems while only 3 of the 20 tenant-operated farms with 50-percent equity could not meet the cash flow requirement of cash farm expenses plus \$12,000 for family living. Even though these two groups have similar equity percentages, more of the owner-operated than the tenant-operated farms encountered cash flow problems. This is because tenants typically rent land for about 4 to 5 percent of its value while owner-operators must pay market interest rates of over 9 percent on their indebted land. Owner-operators also have to pay real estate taxes on owned land. This difference in the cost of controlling land leads to vastly different cash flow situations between these two categories of farmers.

Very few of the owner-operated farms with 100-percent equity and part owner-operated farms with 67-percent equity failed to generate enough farm cash receipts to meet farm cash expenses plus \$12,000 for family living. Farms like the 19 that were unable to generate enough farm cash receipts to meet the farm's cash expenses and the \$12,000 for family living will be unable to continue to farm for long unless they receive some off-farm income.

Thirty of the 100 farm situations were unable to meet the most demanding cash flow requirement: that the farm generate sufficient cash for farm cash expenses, a \$12,000 family living allowance, and a depreciation allowance for farm assets. These farms will have difficulty staying in farming over the long run unless there are positive real capital gains to the assets owned, or unless off-farm income is available, or unless farming conditions improve sufficiently to generate enough cash to replace wornout assets.

Cash flow problems become more prevalent with declining equity. But low equity does not explain fully why farms have cash flow problems. Other possible reasons include an inadequate resource base, low crop yields, unfavorable prices, high overhead or high production expenses relative to farm cash receipts, enterprises that yield low returns on investment, high real estate taxes, and underutilized resources. Some of these reasons are beyond the farmer's control but some are not.

#### Nominal Capital Gains

Farmers who are owner-operators or part owners of their land receive the benefits of capital appreciation (capital gains) on the land they own in addition to the farm income discussed above. Such returns (unadjusted for inflation) can be quite large. Of the 40 owner-operated farms with 100-percent and 50-percent equity, 14 had between \$20,000 and \$59,999 in nominal capital gains from land, 16 had between \$60,000 and \$119,999, and 10 had \$120,000 or more (table 2). Moreover, nominal capital gains also add to net worth. For example, the Missouri beef-hog farm had a nominal (unadjusted for inflation) capital gain from land of \$59,742 in 1979. The beginning net worth in 1980 will be increased by this amount, and thus will strengthen the operator's credit base.

When heavy indebtedness and low incomes cause financial stress, a farmer may be able to convert annual capital gains into cash (monetize the capital gains) to service short or intermediate term debts, particularly if the lender views this procedure as a risk worth taking to keep the farmer in business so the lender can salvage repayment of loans. But planning to monetize capital gains every year is unlikely to meet with the lender's approval. The lender may be unwilling to accept such a strategy when the risks are high or when expected capital gains fail to materialize. See Appendix B for a discussion of how increasing land values can be used to pursue a rapid growth strategy and the dangers associated with such a strategy.

#### Real Farm Wealth

Changes in real farm wealth are influenced by tenure, percent equity, cash receipts, inflation rate, and changes in land values ("Deflated residual income to equity capital" and "Real capital gains and losses"--columns 6 and 8, table 2). A positive number in the table represents the addition to real farm wealth that accrued to the farmer during the year. Such an addition can be used for family living or invested off the farm and still leave the farm's capital position unchanged in real terms from what it was at the beginning of the year. It can, of course, also be invested in the farm, either to reduce indebtedness or to enlarge the farm.

Most owner-operated farms with full equity increased their real wealth substantially in 1979. For example, the wealth of the

Oklahoma cotton-beef farm grew by about \$79,000 and that of the Arkansas rice-soybean farm grew by \$120,000. Some farms grew more, and some grew less: the small South Carolina beef farm had an addition to real wealth of only \$2,600 and the Arizona irrigated cotton farm had about a \$16,000 loss in real wealth because farmland values in Arizona did not increase as fast as inflation.

Because of the interest costs on encumbered land and other resources, part owner farms with 67-percent equity and owner-operated farms with 50-percent equity had smaller additions to real wealth than the owner-operated farms with full equity on any given farm. But even on a number of these encumbered owner-operated farms, real wealth in 1979 increased by between \$30,000 and \$80,000 (table 2).

On the other hand, farms operated by tenants with either 25- or 50-percent equity increased their real wealth by relatively small amounts. On a particular farm, a tenant has fewer resources than an owner with which to generate income and the tenant owns no land on which to realize a capital gain. Hence, the Texas cotton-soybean farm operated by an owner with 100-percent equity realized a \$61,000 addition to real wealth, whereas a tenant with 50-percent equity operating such a farm realized only a \$9,100 addition to real wealth.

The preceding discussion not only shows that changes in real farm wealth are influenced by tenure, percent equity, level of cash receipts, inflation rate, and changes in land values, but it also suggests that owner-operators with strong equity positions can enter as buyers in the land market with greater power than can tenants or owners with low equities.

Changes in real farm wealth, viewed in absolute terms above, can also be viewed in relative terms, for example, relative to net worth or equity. Thus the real rates of return to equity capital (last two columns of table 2) are obtained by dividing both residual real income to equity capital (col. 6) and real capital gains (col. 8), by net worth or equity (col. 1) then multiplying the results by 100; summing the two yields the combined or overall rate. Such rates of return can be used to measure the competitiveness of investments in farming with other investments.

The owner-operated farms with 100-percent equity had real rates of return to equity capital ranging from about zero to 13 percent with most of them between zero and 9 percent (fig. 3).

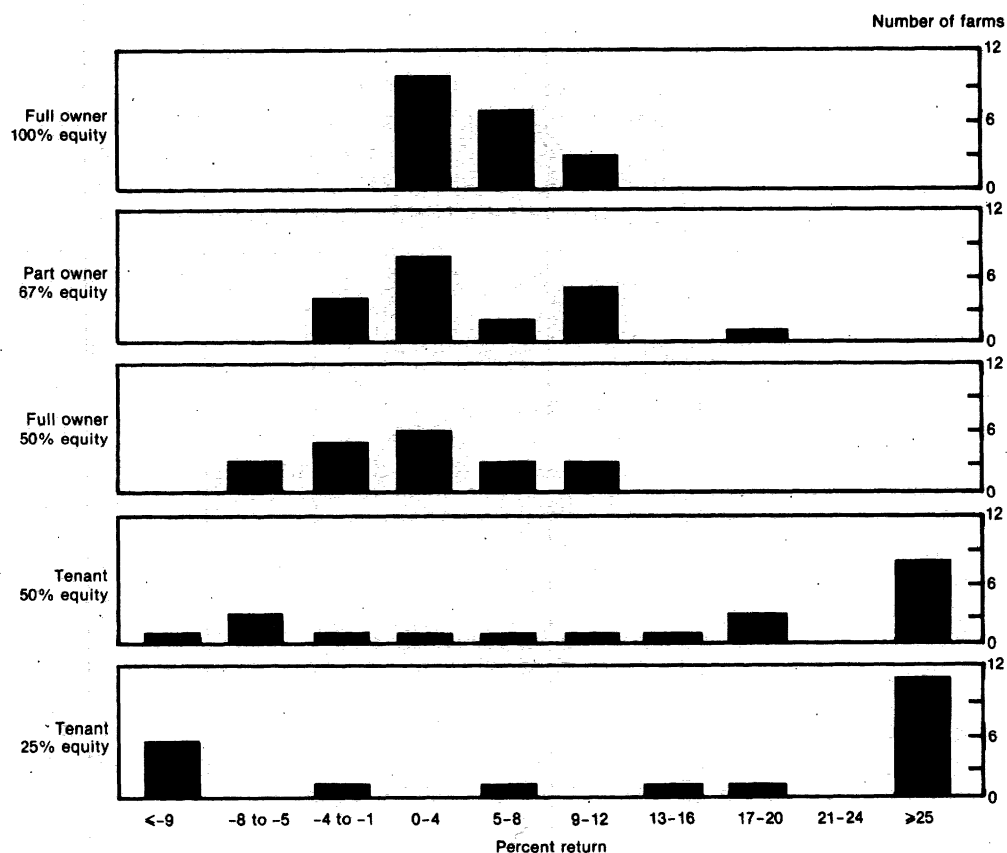
The part owner farms with 67-percent equity and the owner-operated farms with 50-percent equity had a wider range of real

rates of return to equity capital than did the owner-operators with full equity; and more of them ended up with negative real rates of return. The reason is that the owner with 50-percent equity has to service the indebtedness on encumbered assets, as does the part owner. Since the part owner is also part tenant, his (her) returns will in part reflect those of an encumbered owner and in part those of a tenant.

Most of the tenant-operated farms realized either very high positive real rates of return or negative real rates. Three reasons why some encumbered tenants were receiving much higher positive real rates than the encumbered owners is: (1) the relatively high residual returns to equity capital on these farms, whether owner- or tenant-operated; (2) these tenants'

Figure 3

### Rates of Return to Equity Capital From Residual Income by Tenure and Equity Position, 1979



rental costs on land were less than the owners' carrying costs of interest and real estate taxes on land; and (3) the divisor (net worth) used in computing the returns is much smaller, thereby magnifying the effect of a given level of returns on the rate of return.

The explanation why some encumbered tenant farms realized higher negative rates of return than encumbered owner-operated farms is: (1) the relatively low net cash farm incomes on encumbered farms, whether owner- or tenant-operated, become negative residual incomes to equity capital when allowances for depreciation, and operator and family labor are subtracted from them; (2) dividing negative residual returns by the lower net worths on the encumbered tenant farms yields high negative rates of return on equity. Possible reasons for the relatively low net cash farm incomes on these farms (although not related to tenancy or equity levels) appear to be factors like low crop yields, high production costs, low product prices, underutilized resources, too small a farm, and enterprises that normally yield low rates of return to capital.

Even though some tenant-operated farms with 50-percent equity or less yielded high real rates of return to equity capital, the absolute real amounts of residual income to capital were not very large. For instance, the Illinois corn-soybean farm, when operated by a tenant with 25-percent equity had a 31-percent real rate of return compared with only 4 percent when operated by a full owner with 100-percent equity; but the owner-operator had a real residual income to equity capital of \$36,000 compared with \$9,400 for the tenant operator. The tenant farm operator simply has very little equity capital.

As percentage of equity declines from the owner-operator farms with full equity, to the part owner with 67 percent, to the owner with 50 percent, the number of farms with negative real rates of return to equity capital increases. This relationship is expected because, as percent equity declines, more of the resources are encumbered, which increases their carrying costs.

In 14 of the 19 States where the illustrative farms are located, land values increased faster than the general inflation rate in 1979, resulting in real capital gains from land. Those 14 States contain 75 of the 100 farm situations included in this report. Of these 75 farm situations, 45 are full or part owner farms. The remaining 30 farms are tenant-operated farms, which cannot benefit from capital gains accruing to land.

For the 45 landowning farms, then, the additions to the farm's real wealth increased when the real capital gains from land were added to the residual real income to equity capital (the returns

left to a farmer's own capital after all other resources have been paid). In fact, for 8 of the 45, the capital gains more than offset negative residual real incomes to equity capital, resulting in net additions to the farm's wealth.

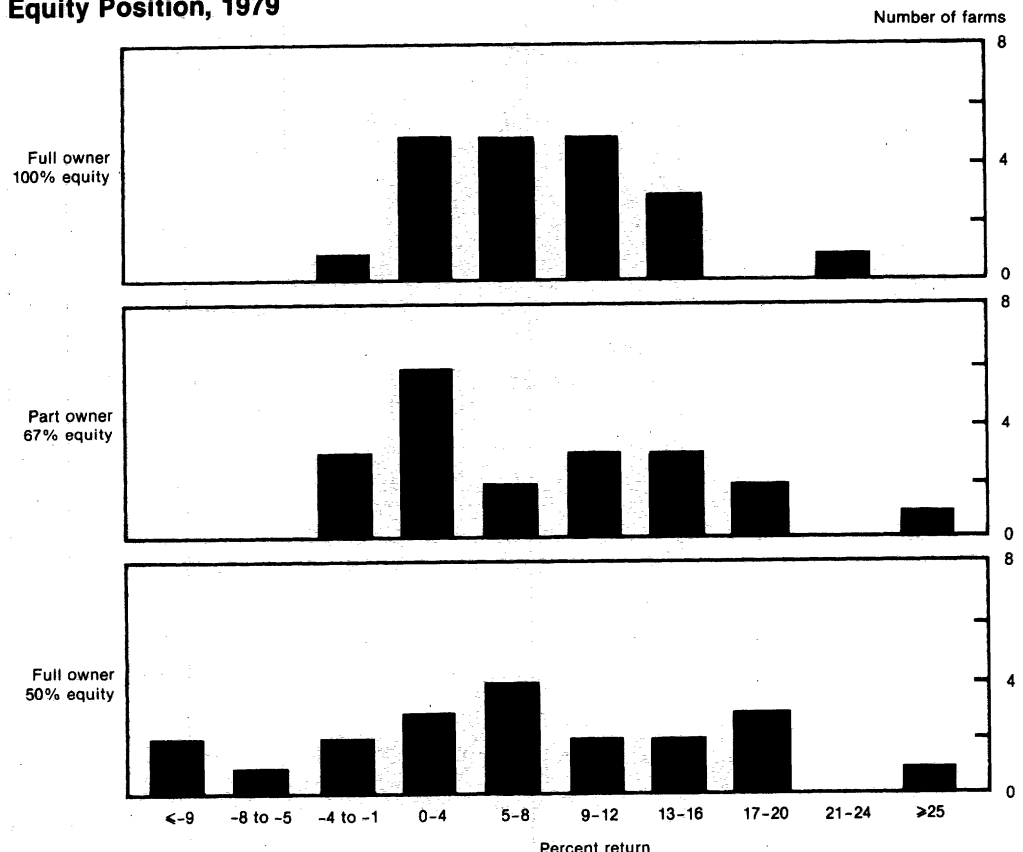
Figure 4 shows the real rate of return to equity capital from residual income to capital and capital gains for the 60 landowning farms in 1979. Over half (35) of the 60 farms had rates of return between 0 and 13 percent. Sixteen of these 60 had real rates of return of 13 percent or more and 9 had negative rates. How competitive these real rates of return are depends on the real rates of return in alternative investments. Real rates of return of 3 to 6 percent are generally considered favorable.

Effects of Product  
Price Changes on  
Equity Needs

Table 4 shows the percentage equity needed in order to allow \$12,000 from the farm business for family living after paying all cash farm expenses, interest payments on indebtedness, and

Figure 4

**Combined Real Rates of Return to Equity Capital  
From Residual Income and Capital Gains by Tenure and  
Equity Position, 1979**



Tenant situations are not included because they have no capital gains.



THE ECONOMIC WELL-BEING OF ILLUSTRATIVE FARMS

Table 4--Equity percentages at varying price levels for \$12,000 net farm income above farm operating costs, interest payments on indebtedness, and depreciation costs

Farm location, enterprise, and tenure	Price level		
	10 percent :	:	10 percent
	below 1979 :	1979 :	above 1979
	Percent equity 1/		
Arizona irrigated cotton:			
Full owner	93	82	71
Tenant	23	0	0
Part owner	89	68	47
Arkansas rice-soybean:			
Full owner	34	8	0
Tenant	0	0	0
Part owner	27	0	0
California rice:			
Full owner	9	0	0
Tenant	0	0	0
Part owner	0	0	0
Colorado winter wheat:			
Full owner	80	72	64
Tenant	100	89	55
Part owner	88	76	64
Georgia peanut:			
Full owner	72	47	21
Tenant	100	100	29
Part owner	100	63	25
Illinois corn-soybean:			
Full owner	77	66	55
Tenant	40	0	0
Part owner	74	60	46
Iowa corn-hog:			
Full owner	78	63	48
Tenant	85	3	0
Part owner	83	59	35

See footnote at end of table.

Continued--

Table 4--Equity percentages at varying price levels for \$12,000 net farm income above farm operating costs, interest payments on indebtedness, and depreciation costs--Continued

Farm location, enterprise, and tenure	Price level		
	10 percent	:	10 percent
	below 1979	: 1979 :	above 1979
	<u>Percent equity 1/</u>		
Kansas winter wheat:			
Full owner	34	16	0
Tenant	0	0	0
Part owner	19	0	0
Minnesota corn-beef:			
Full owner	90	76	62
Tenant	100	100	60
Part owner	100	85	66
Mississippi cotton-soybean:			
Full owner	34	6	0
Tenant	0	0	0
Part owner	27	0	0
Missouri beef-hog:			
Full owner	60	44	28
Tenant	28	0	0
Part owner	58	35	12
Montana winter wheat:			
Full owner	67	56	45
Tenant	0	0	0
Part owner	60	45	29
Nebraska irrigated corn:			
Full owner	61	47	34
Tenant	22	0	0
Part owner	58	40	21
North Dakota wheat-potato:			
Full owner	30	2	0
Tenant	100	30	0
Part owner	52	10	0

See footnote at end of table.

Continued--

Table 4--Equity percentages at varying price levels for \$12,000 net farm income above farm operating costs, interest payments on indebtedness, and depreciation costs--Continued

Farm location, enterprise, and tenure	Price level		
	10 percent		10 percent
	below 1979	1979	above 1979
	Percent equity 1/		
Ohio soybean-grain:			
Full owner	84	73	62
Tenant	100	100	89
Part owner	95	82	69
Oklahoma cotton-beef:			
Full owner	40	24	8
Tenant	0	0	0
Part owner	28	2	0
South Carolina beef:			
Full owner	100	100	100
Tenant	100	100	100
Part owner	100	100	100
Texas cotton-sorghum:			
Full owner	73	55	36
Tenant	67	15	0
Part owner	73	48	23
Texas peanut:			
Full owner	73	55	36
Tenant	67	15	0
Part owner	73	48	23
Washington winter wheat:			
Full owner	46	31	16
Tenant	0	0	0
Part owner	34	14	0

1/ Farms showing a 100-percent equity requirement are unable to earn \$12,000 in income, net of cash farm expenses, including interest costs on indebtedness and depreciation costs.

annual depreciation on farm assets, but excluding principal payments on indebtedness. The percentages reflect longer run equity needs to assure money for replacement of depreciable assets. For example, on the Nebraska farm, the net cash farm income for the full owner with no indebtedness is \$75,129; a residual of \$50,033 remains after subtracting the \$12,000 living allowance and depreciation costs of \$13,096. This residual will service a debt of \$532,266 at the 9.4 percent interest rate that prevailed in Nebraska in 1979. With assets valued at \$995,089, this farmer must have a minimum of \$462,823 ( $\$995,089 - \$532,266$ ) in equity or 47 percent of the assets. The equity needs are shown for three different price levels: the 1979 level and the 1979 level hypothetically reduced and increased by 10 percent. Farm input prices at 1979 levels are assumed in all situations.

The equity percentages needed to meet the required payments varied considerably for most farm situations as product prices were changed. For most of the full owner and part owner farms, the needed equity percentages declined by 20 to 40 percentage points as product prices were increased from 10 percent below to 10 percent above their 1979 levels.

On some farm situations, like the South Carolina beef farm, the needed equity percentages were high relative to those for other farms and remained high regardless of the product price changes. The economic health of these farm situations would need to be improved by generating more income from their assets, expanding their operations, or reducing costs before modest product price changes would help their situations greatly. On other farm situations, the equity percentages needed to make the required payments were low relative to those on other farms, and remained low regardless of product price changes. The economic health of these farms was relatively good; a modest decline in product prices could be weathered without undue difficulty.

The tenant farm situations appear to fall into one of two categories: either they need relatively low equity percentages to meet all the specified payments and still have \$12,000 left for family living, or they are unable to meet the specified needs, even with 100-percent equity. On the most productive farms, tenants can borrow all or most of the money needed to buy the machinery, pay the interest on the loan, pay cash farm expenses including rent, set aside the amount needed for annual depreciation, and still have enough left to meet the \$12,000 family living expenses. On these productive farms, tenants have high incomes in relation to their asset values, higher than full or part owner-operated farms; thus, the owner and part owner farms need higher equity percentages than do the tenants to meet the specified requirements.

Although general rules are sometimes suggested on what is a safe equity level, one would do better to realize that equity needs change with product and input prices, and at any given set of prices, equity needs will vary from one farm to another because of the differences in quality and quantity of resources and the efficiency with which those resources are used. The table illustrates the danger of adhering to any fixed rule.

ECONOMIES OF SIZE  
AND THE ECONOMIC  
WELL-BEING OF  
FARMING

One of the most far-reaching changes in U.S. agriculture over the last 40 years has been a decline in farm numbers and an increase in farm size. A major reason for the increases in size is the desire for more income. The additional income is possible because some economies of size do exist in farming; in other words, over some range of output, unit costs decline with increased volume of output. Cost economies occur as a result of realizing technical efficiencies, mainly from two sources:

- Labor-saving technology (substitution of larger machines for labor), which has allowed the area of land farmed per unit of labor to increase by a factor of four since 1940.
- The spreading of fixed overhead costs over more acres. A 120-horsepower tractor, for example, is not used very efficiently on 30 acres, but it can be used efficiently when used over larger areas, provided that timely operations are assured.

Besides technical efficiencies, which give rise to cost economies of size, economies of size can come from a farmer's gaining marketing efficiencies with larger volumes of output. Farmers can often obtain discounts by buying in volume and can realize premium prices by selling in volume.

When net farm incomes rise with increases in farm size, whether due to technical economies or to market economies, the economic well-being of the farm families who operate these farms also rises. Society may also gain because food and fiber are being produced more efficiently. In other words, resources are being used more efficiently in the farm sector. If the result is slower growth in food prices, or if resources released from agriculture can be more productively employed in the nonfarm sectors, then society also gains from this shift in resources.

The budgets for four cash grain farms of varying size in Washington State were computed to illustrate how technical economies of size can influence economic well-being in farming (table 5). The cost economies realized came about through substituting machinery (capital) for labor and through spreading the fixed overhead costs of the machines over larger acreages or outputs.

ECONOMIES OF SIZE AND THE ECONOMIC  
WELL-BEING OF FARMING

Table 5--Cash grain farm budgets, Washington State, 1978

Item	Unit	Farm 1	Farm 2	Farm 3	Farm 4
Farm size	Acres	125	300	640	1,280
Operator labor	Work-years	1	1	1	1
Labor, part-time hired	Hours	0	0	0	213
Crop area:					
Barley	Acres	19	46	101	200
Wheat after fallow	do.	40	96	208	413
Wheat after grain	do.	22	52	113	225
Gross receipts	Dollars	10,858	26,240	57,004	113,102
Total expenses	do.	6,719	14,860	27,708	56,670
Costs per acre	do.	53.75	49.53	43.29	44.27
Costs per \$100 of gross receipts	do.	61.88	56.63	48.61	50.10
Net returns <sup>1/</sup>	do.	4,139	11,379	29,295	56,432

<sup>1/</sup> Net returns are net cash farm income less depreciation and less operator labor and management and family labor.

According to the budgets, significant economies of size can be realized, up to and including the 640-acre farm. That is, costs per acre and costs per \$100 of gross receipts decline as farm size increases from 125 acres up to and including 640 acres. As unit costs decline with increased output, net returns increase to make farming more profitable. Not only is farming more profitable but resources are used more efficiently, an overall gain to society.

Unit costs for the 1,280-acre farm were slightly higher than for the 640-acre farm. Actually, unit costs for the largest farm may have been the same as, or lower than, those for the 640-acre farm had the costs for the bigger machines on the largest farm been spread over slightly more area than 1,280 acres. Although in this example, resources are not used more efficiently (through reductions in unit costs) on the 1,280-acre grain farm in Washington than on the 640-acre farm, the table does show that farm families who increase their farm size from 640 to 1,280 acres can raise their net incomes considerably. Thus, net income can be increased through increasing farm size even though unit costs are not reduced. As long as the cost of the last unit of production remains below the product price as the volume of output is increased, net farm income must rise, thereby enhancing the economic well-being of the farm families who expand their operations. Moreover, such large operations may

derive offsetting market economies of size even if their unit costs of production are greater.

Labor-saving technological innovations along with income and estate tax policy, farm commodity and credit programs, and farmers' desires for more income have fostered structural change. As farms have grown larger, the outlays for land, machinery, and equipment per farm have increased. The continued growth in capital requirements has created serious financing problems for many beginning farmers. It has become increasingly difficult for younger entering farmers to acquire capital to purchase farm assets, buy out the other heirs involved, or pay the estate taxes on farms. As a result, some farm families incorporate their farm businesses and by doing that they may not only overcome the recapitalizing problem each generation faces, but may enhance growth opportunities for the farm. On the other hand, capital requirements have constrained a large number of farms to a size that provides less than full employment for the farm family. In these instances, off-farm earnings are needed to meet the cash flows needed for operating the farm, for family living, and for amortizing loans.

APPENDIX A: BRIEF  
DESCRIPTION OF THE  
ILLUSTRATIVE FARMS

Arizona Irrigated Cotton Farm, typical of farms in the Maricopa, Pinal, and Pima County area, has 1,440 acres with about 640 acres of irrigated land. The remainder is dryland range usually unused in the farming operation. The farm has 380 acres in cotton, 210 acres in wheat, and 50 acres in alfalfa--all irrigated. Average yields in 1979 were: 1,044 pounds per acre of cotton lint, 1,716 pounds per acre of cottonseed, 74 bushels per acre of wheat, and 6.5 tons per acre of alfalfa. Average prices received in 1979 were: cotton lint, 64.2 cents per pound; cottonseed, 5.9 cents per pound; wheat, \$3.80 per bushel; and alfalfa, \$61 per ton. Labor amounted to 0.7 work-year of operator labor, one work-year of full-time salaried labor, 1,744 hours of seasonal hired labor, and 330 hours of family labor.

Arkansas Rice and Soybean Farm has 850 acres with 750 crop acres of which 250 acres are irrigated rice, 100 acres are irrigated soybeans, and 400 acres are dryland soybeans. <sup>1/</sup> Average yields in 1979 were: rice, 42.73 cwt per acre; irrigated soybeans, 35.76 bushels per acre; and dryland soybeans, 27.1 bushels per acre. Average prices in 1979 were \$10.32 per cwt for rice; and \$6.33 per bushel for soybeans. Labor amounted to 1 work-year of operator labor, 600 hours of family labor, 1 work-year of full-time salaried labor, and 1,246 hours of part-time hourly labor.

California Rice Farm in the Sacramento Valley has 1,200 acres of land of which 1,176 acres are cropland--all irrigated. Acreages in crops are: 650 in rice, 386 in wheat, and 140 in grain sorghum. In 1979, yields averaged 64.1 cwt per acre for rice, 85 bushels per acre for wheat, and 74 bushels per acre for grain sorghum. Average prices received in 1979 were: \$9.64 per cwt for rice, \$4.22 per bushel for wheat, and \$3.02 per bushel for grain sorghum. The farm labor force consisted of the operator, 1,871 hours of family labor, 2 full-time hired laborers, and 1,021 hours of seasonally hired labor.

Colorado Winter Wheat Farm has 3,160 acres with 720 acres of wheat, 720 acres of fallow, 100 acres of hay, and 1,620 acres of pasture. The farm also runs a herd of 107 beef cows. Wheat yields in 1979 averaged 23.1 bushels per acre. Prices received in 1979 averaged \$3.55 per bushel for wheat, \$100.78 per cwt for steer calves, \$34.53 per cwt for heifer calves, \$76.08 per cwt for feeder steers, and \$69.84 for feeder heifers. Labor supply consisted of 1 work-year of operator labor, 411 hours of family labor, one-half year of full-time salaried labor, and 137 hours of part-time hourly labor.

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<sup>1/</sup> Total acres in crop and pasture land may not always add up to total acres in the farm since acres in farmstead, lots, wasteland, and woodland were not enumerated.



Georgia Peanut Farm has 480 acres of land of which 125 are in peanuts, 220 in corn, 15 in coastal hay, 60 in coastal pasture, and 60 in native pasture. The farm runs a beef cow herd of 50 cows. In 1979, crop yields averaged 3,271 pounds per acre for peanuts and 79 bushels for corn. Prices received in 1979 were 20 cents per pound for peanuts, \$2.83 per bushel for corn, \$91.95 per cwt for steer calves, and \$75.45 per cwt for heifer calves. The farm labor force included 1 work-year of operator labor, 432 hours of family labor, 1 work-year of full-time salaried labor, and 155 hours of part-time hourly labor.

Illinois Corn-Soybean Farm has 400 acres with 380 dryland crop acres, of which 200 acres are in corn and 180 acres are in soybeans. Average yields in 1979 were 127 bushels per acre for corn and 40 bushels per acre for soybeans. Average prices received were \$2.37 per bushel for corn and \$6.33 per bushel for soybeans. Labor is provided by the operator with 169 hours of family labor and 152 hours of part-time labor.

Iowa Corn and Hog Farm has 320 acres of which 275 are dryland crop acres and 30 acres are in pasture. Cropland is planted to 150 acres of corn and 125 acres of soybeans. Fifty sows are farrowed twice a year on this farm. Crop yields in 1979 averaged 139 bushels per acre for corn and 38.5 bushels per acre for soybeans. Prices received in 1979 were \$2.15 per bushel for corn, \$6.20 per bushel for soybeans, and slaughter hogs ranged from \$34.43 to \$51.43 per cwt. Available labor was 1 work-year of operator labor, 482 hours of family labor, and 931 hours of part-time labor.

Kansas Winter Wheat Farm has 920 acres with 640 acres in winter wheat, 100 acres in sorghum, 20 acres in hay, and 160 acres in pasture. The farm also supports a herd of 30 beef cows and 100 stockers. Crop yields in 1979 were 37 bushels per acre for wheat, 51.6 bushels per acre for sorghum, 2.8 tons per acre for hay. Prices received in 1979 were: wheat, \$3.72 per bushel; grain sorghum, \$2.20 per bushel; steer calves, \$95.10 per cwt; heifer calves, \$85.10 per cwt; feeder steers, \$95.78 per cwt; and feeder heifers, \$85.78 per cwt. Labor consisted of 1 work-year of operator labor, 203 hours of family labor, and 256 hours of part-time hourly labor.

Minnesota Corn and Beef-Feeding Farm has 320 acres with 288 dryland crop acres and 20 acres of pasture. The cropping system consists of: corn, 110 acres; corn silage, 25 acres; soybeans, 110 acres; oats, 20 acres; and hay, 15 acres. Each year, 100 steers are fed out. Crop yields in 1979 were: corn for grain, 102 bushels per acre; corn silage, 13.5 tons per acre; soybeans, 31 bushels per acre; oats, 51 bushels per acre; and hay, 4.2 tons per acre. Prices received in 1979 were: corn, \$2.06 per

bushel; soybeans, \$6.07 per bushel; oats, \$1.14 per bushel; legume hay, \$43 per ton; and slaughter steers ranged from \$60.04 to \$62.01 per cwt. Labor was 1 work-year of operator labor, 294 hours of family labor, and 199 hours of part-time hourly labor.

Mississippi Delta Cotton-Soybean Farm has 900 acres with 810 dryland crop acres of which 360 acres are in cotton, 370 acres in soybeans, and 80 acres in wheat. Per acre yields in 1979 were: cotton lint, 663 pounds; cottonseed, 1,017 pounds; soybeans, 28 bushels; and wheat, 34 bushels. Average prices received were: cotton lint, 61.2 cents per pound; cottonseed, 6.7 cents per pound; soybeans, \$6.28 per bushel; and wheat, \$3.80 per bushel. Labor amounted to 1 work-year of operator labor, 503 hours of family labor, 3 work-years of full-time salaried labor, and 445 hours of part-time hourly labor.

Missouri Beef and Hog Farm has 361 acres of which 100 acres are in corn, 80 in soybeans, 50 in clover pasture, and 91 in Bermuda grass pasture. The livestock enterprises consist of 35 beef cows and 20 sows. Average crop yields in 1979 were 106 bushels per acre for corn and 31 bushels per acre for soybeans. Crop prices in 1979 were \$2.28 per bushel for corn, \$6.17 per bushel for soybeans, \$80.78 per cwt for feeder steers, \$69.85 per cwt for feeder heifers, and \$96.88 per cwt for steer calves, \$79.04 per cwt for heifer calves, and slaughter hogs ranged from \$35.91 to \$51.79 per cwt. Available labor on this farm consisted of 1 work-year of operator labor, 233 hours of family labor, and 279 hours of part-time hourly labor.

Montana Winter Wheat on Fallow Farm has 3,040 acres of which 2,720 are dryland cropland, half fallow and half cropped as follows: winter wheat, 940 acres; spring wheat, 200 acres; and barley, 220 acres. Yields in 1979 averaged 25 bushels per acre for winter wheat, 20 bushels per acre for spring wheat, and 33 bushels per acre for barley. Prices received in 1979 were \$3.67 per bushel for wheat and \$1.88 per bushel for barley. Labor was provided by 1 work-year of operator labor, 502 hours of family labor, and 487 hours of part-time hourly labor.

Nebraska Irrigated Corn Farm has 640 acres with 320 acres of irrigated corn, 80 acres of wheat, 80 acres of alfalfa, and 140 acres of pasture. The farm supports a herd of 30 beef cows. Crop yields in 1979 were 132 bushels per acre for corn, 44 bushels per acre for wheat, and 4 tons per acre of alfalfa. Prices received in 1979 were \$2.22 per bushel for corn, \$3.70 per bushel for wheat, \$41.40 per ton for hay, \$99.42 per cwt for steer calves, \$83.39 per cwt for heifer calves, \$75.56 per cwt for feeder steers, and \$69.36 per cwt for feeder heifers. Labor consisted of 1 work-year of operator labor, 496 hours of family labor, and 943 hours of part-time hourly labor.

North Dakota Spring Wheat-Potato Farm has 990 acres of which 805 acres were cropped in 1979 and 185 acres were idled or fallowed. There were 415 acres in wheat (of which 135 acres were on fallowed ground), 116 acres of barley, and 274 acres of potatoes. In 1979, the crops yielded 30.5 to 32 bushels per acre for wheat, 49.4 bushels per acre for barley, and 160 cwt per acre for potatoes. Prices in 1979 for these crops averaged \$3.61 per bushel for wheat, \$2.21 per bushel for barley, and \$2.60 per cwt for potatoes. Labor consisted of 1 work-year of operator labor, 530 hours of family labor, and 1,314 hours of part-time hourly labor.

Ohio Soybean, Corn, and Winter Wheat Farm has 240 acres with 220 dryland crop acres of which 90 acres are in soybeans, 35 are in winter wheat, and 95 are in corn. Average yields in 1979 were 36 bushels per acre for soybeans, 49 bushels per acre for wheat, and 117 bushels per acre for corn. Average prices per bushel received were: corn, \$2.49; wheat, \$4.10; and soybeans, \$6.39. Labor on this farm amounted to 0.6 work-year of operator labor, 78 hours of family labor, and 44 hours of part-time hired labor.

Oklahoma Cotton-Wheat-Beef Cow Farm has 960 acres. All crop acres are dryland consisting of 140 acres of cotton, 420 acres of wheat, and 50 acres of hay. Pasture totals 320 acres for a beef cow herd of 30 cows. Last year's crop yields averaged 369.1 pounds per acre of cotton lint, 573.5 pounds per acre of cottonseed, 33.1 bushels per acre of wheat, and 2.56 tons per acre of hay. Prices received in 1979 were 57.4 cents per pound for cotton lint, 5.6 cents per pound for cottonseed, \$3.98 per bushel for wheat, \$67 per ton for hay, \$92.66 per cwt for steer calves, \$73.79 per cwt for heifer calves, \$88.74 per cwt for feeder steers, \$74.99 per cwt for feeder heifers, and \$62.03 per cwt for stocker heifers. The farm labor supply is composed of 1 work-year of operator labor, 261 hours of family labor, and 30 hours of part-time hourly labor.

South Carolina Beef Cattle Farm has 320 acres with 245 acres of crop and pasture land, of which 120 acres are in fescue, 75 acres in Bermuda grass, and 50 acres in corn. Corn yields in 1979 averaged 77 bushels per acre. The farm runs a herd of 50 beef cows. Prices received in 1979 averaged \$2.83 per bushel for corn, \$102.16 per cwt for steer calves, and \$78.58 per cwt for heifer calves. Labor supply consisted of 1 work-year of operator labor, 36 hours of family labor, and 16 hours of part-time hourly labor.

Texas High Plains Cotton and Sorghum Farm has 720 acres of which 190 acres are dryland crop acres, 450 acres are irrigated cropland, and 55 acres are pasture. It has 200 irrigated cotton

acres, 250 irrigated sorghum acres, 100 acres of dryland cotton, and 90 acres of dryland sorghum. In 1979, crop yields per acre on irrigated acres were 451 pounds of cotton lint, 713 pounds of cottonseed, and 79 bushels per acre of sorghum. On dryland, crop yields averaged 210 pounds of cotton lint, 18 pounds of cottonseed, and 24 bushels per acre of sorghum. Prices received in 1979 averaged 56.2 cents per pound for cotton lint, 5.7 cents per pound for cottonseed, and \$2.48 per bushel for sorghum. Labor supply consisted of 1 work-year of operator labor, 600 hours of family labor, 1 work-year of full-time salaried labor, and 292 hours of part-time hourly labor.

Texas Peanut Farm has 600 acres with 240 cropland acres of which 140 acres are in peanuts, 50 acres in sorghum, and 50 in cropland pasture. There are 340 acres of native pasture sustaining a beef cow herd of 50 cows. Crop yields in 1979 averaged 981 pounds per acre for peanuts and 24.5 bushels per acre for sorghum. In 1979, prices received were as follows: peanuts, 21 cents per pound; grain sorghum, \$2.48 per bushel; steer calves, \$92.60 per cwt; heifer calves \$73.79 per cwt; feeder steers, \$93.65 per cwt, and feeder heifers, \$81.67 per cwt. Labor supply consisted of 1 work-year of operator labor, 82 hours of family labor, and 91 hours of part-time hourly labor.

Washington Palouse Winter Wheat Farm has 1,280 acres with 1,250 dryland crop acres. The crop acres are devoted to 300 acres of wheat after fallow, 300 acres in fallow, 250 acres winter wheat after crop (on land not fallowed), 200 acres of dry peas, and 200 acres of barley. Crop yields in 1979 averaged from 43 to 52.6 bushels per acre for wheat, 17.36 cwt per acre for dry peas, and 52 bushels per acre for barley. Prices received in 1979 were \$4.21 per bushel of wheat, \$8 per cwt of peas, and \$2.45 per bushel of barley. Labor was 1 work-year of operator labor, 302 hours of family labor, and 348 hours of part-time hourly labor.

APPENDIX B: FARM  
GROWTH THROUGH  
PERIODIC REFINANC-  
ING OF HIGHLY  
LEVERAGED ASSETS

With the rapid rise in land values over the past decade, some farmers have undertaken growth strategies that are uncomfortably similar to the disruptive pyramiding schemes widely practiced by some businesses during the first part of this century. The strategy is growth through leveraging of appreciating assets by periodically using the appreciation as the base for additional borrowing. When incomes in the farm sector or increases in asset values are above average, this strategy can earn phenomenal rates of return on equity, but when incomes are below average, losses can quickly bankrupt the operator.

The general procedure followed in using such a strategy on an annual basis could be (its most extreme form):

1. Purchase land with the minimum amount of equity required to qualify for the loan. To keep this illustration simple, assume the land is purchased in January.
2. The operator farms it, and the residual return to land is computed at the end of the year. that is, the amount that remains after cash farm expenses have been paid and family living expenses met, along with an annual allowance for depreciation of farm assets.
3. During the year, land prices are assumed to have risen. Since the mortgage is for a fixed amount, the owner's equity would have risen by an amount equal to the capital gains to land. Since the owner's percentage equity at yearend would exceed the level required by the lending institution, the owner seeks to refinance the mortgage to obtain cash for expansion and drop the equity proportion back down to the minimum level required. In other words, most of the capital gains to land would be monetized within the year through refinancing (all except the proportion required as additional equity in the new loan). This money is then used to pay interest costs on the original loan and to finance additional land purchases.

The above procedure describes the effects in the first year of any farm expansion using leverage on land assets. The risks in the first year are the same whether it is done every year, every few years, or once in a farmer's lifetime.

The implications of this analysis should be highlighted early in the discussion. The strategy for growth described here is a high-risk strategy. Conditions favorable to its use are continuously high nominal residual returns to land and continued high nominal increases in land values. When farm incomes drop and increases in land values begin to level off, the means for

refinancing the interest due on heavily indebted assets are no longer available to highly leveraged farmers and the likely outcomes are defaulting on contractual payments and, possibly, loss of the business.

The following equation can be used as a simplified framework to identify the important variables involved in this rapid growth strategy.

$$\text{Nominal return on equity } \frac{1}{\text{equity}} = \frac{X1 + X2 - X5(1-X4) - (1-X4)(1+X2)X3}{X4} * 100$$

where X1 = Nominal net residual income to land expressed as a proportion. 2/

X2 = Returns to land from nominal capital gains, expressed as a proportion.

X3 = Costs incurred in refinancing, expressed as a proportion of the amount to be refinanced.

X4 = Minimum equity proportion required by a lending institution.

X5 = Interest rate on land.

To be successful, the nominal residual to land, X1, plus the nominal capital gains to land, X2, must exceed the interest cost, X5(1-X4), plus the refinancing cost, (1-X4)(1+X2)X3. Two examples for the year 1979 can illustrate the results of such a rapid growth strategy. The farm in Montana illustrates a case where this high risk strategy would have failed and the farm in Washington illustrates a case where the strategy would have succeeded.

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1/ The return to equity calculated here differs from that elsewhere in this report in the following manner. First, returns to equity here are in nominal terms while elsewhere in the report returns to equity are in real (adjusted for inflation) terms. Second, this section deals with farm firm growth and a specific strategy for achieving that goal. Elsewhere in the report, farm firm growth does not enter into the analysis.

2/ Column 5, table 2 is a residual return to land and machinery. For this analysis, the returns to machinery are assumed to just cover interest costs on machinery indebtedness, leaving returns to land as used in these examples.

The following assumptions are made for these two examples:

1. Refinancing costs, X3, are assumed to be 1 percent of the value of the new loan.
2. Lending institutions will lend farmers 80 percent of the value of the owned land, 1-X4.
3. The interest rate, X5, on land is 10 percent; for simplification, amortization is ignored because in the beginning years of a loan the principal payment is not very large anyway.

#### Montana

The Montana farm had a nominal residual return to land (X1) of approximately 4 percent. The farm's nominal capital gains to land of \$35,138 on land valued at \$924,695 at the beginning of the year equals a 3.8-percent return. Inserting these values into our equation gives:

$$\text{Nominal return on equity} = \frac{.04 + .038 - .10(1-.20) - (1-.2)(1+.038).01}{.20} * 100 = -5\%$$

This Montana farmer would have defaulted on the mortgage by leveraging his/her position in this manner and by planning on making the interest payment on the original loan out of the money captured by refinancing the land with its nominal capital gain.

#### Washington

The Washington farm had a residual to land (X1) of approximately 6 percent. Nominal capital gains to land were \$105,660 and land was valued at \$903,085 giving an 11.7-percent return. These values, along with the assumed values, give:

$$\text{Nominal return on equity} = \frac{.06 + .117 - .10(1-.20) - (1-.2)(1+.117).01}{.20} * 100 = 44\%$$

This farm would have earned a very high rate of return of 44 percent.

The analysis assumes farmers and lenders are confident that land prices will go up and they are willing to take higher risks to expand their farms. Most farmers, however, are not high-risk takers. They prefer instead to build their equity up to safe levels as witnessed by the greater than 80-percent equity level in farm assets nationally. Another assumption implicit in the analysis is that a lending institution would be willing to refinance a mortgage periodically so that a farmer could pursue such a rapid growth strategy. Lenders prefer to have the

interest repaid each year and are wary of refinancing the interest due back into a new mortgage. To keep businesses operating, lenders sometimes have no choice but to refinance a farmer unable to make payments during years of relatively low income. But to pursue such a course with the obvious intent of pyramiding is unlikely unless the rewards to the lender for taking the additional risks are relatively high. Consequently, the lender would be expected to increase its interest rates or refinancing charges. When a lender increases its interest charge due to a perceived increase in riskiness of a loan, the risk faced by the farmer increases because the spread between the return items,  $X_1+X_2$ , and the cost items,  $X_3+X_5$ , decreases or may become increasingly negative as in the case of the Montana farm.



## GLOSSARY

Cash Flow - The process of matching income and expenditures over time to allow paying off debts and expenses when they come due. Farmers are faced with cash flow problems both within the year and between years. Within year problems arise because farmers incur expenses throughout a production cycle yet usually receive payment for their product only at the end of the production period. Money must be borrowed or drawn from savings to overcome the shortfall during the production period. Cash flow problems between years occur because of low residual rates of return to land. If interest rates are above 10 percent and land is earning a return of only 4 percent, a farmer faces a cash flow problem in servicing the indebtedness out of current earnings. The land input is appreciating in value over time, but this capital gain usually cannot be captured within the current production cycle to help cover expenses and service debts.

Equity - Synonymous with net worth (which see) when discussed as a dollar value. When discussed as a percentage it is equal to net worth divided by the value of all owned assets whether encumbered or not, then multiplied by 100.

Family and Operator Labor Charge vs. Family Living Allowance - Family and operator labor charge is the money allocated to the farm family in the form of a wage for actual hours worked (table 2). This may or may not be sufficient to support a farm family. In table 4, a \$12,000 allowance for family living expenses is discussed. In this instance, the allowance is not related to work performed but instead indicates the minimum opportunity cost for a year's labor that must be met to keep a farmer from seeking off-farm employment.

Leveraging - A strategy of acquiring assets with a large proportion of borrowed funds. Any absolute changes in the value of all the assets accrue to the small amount of equity, many times giving rise to extremely large positive or negative returns to equity.

Net Cash Farm Income - Cash farm receipts remaining after paying cash farm expenses including interest on indebtedness (gross receipts minus cash expenses).

Net Worth - The difference between the value of all farm assets and any liabilities against these assets. It is the amount of money a farmer could capture if the farm business were liquidated today. In this report, levels of net worth are arbitrarily defined percentages of the value of all farm assets.

Nominal - When a term is preceded by nominal, the term is being expressed in dollars valued at that time, for example, nominal

capital gains for 1979. The current dollar value of an asset is being described, not the real purchasing power of those dollars.

Owned Assets - Assets in which the owner-operator assumes the risk of asset appreciation or depreciation. In contrast, on rented land, these risks are borne by the landlord.

Real - When a term is preceded by real, that term is being expressed in constant dollars from an earlier point in time. Nominal values are deflated by the rate of inflation to get real values. The rate of inflation used in this report was 11.2 percent for 1979. That figure represents the mean of the Consumer Price Index and the GNP implicit price deflator between the months of November 1978 and November 1979. November was chosen to correspond to the date when land price changes are reported by ESS, USDA.

Residual to Equity Capital - The money remaining from net cash farm income after paying operator and family labor and depreciation. It is a residual return on a farmer's equity or net worth.

Tenure Arrangement - Landownership arrangement. For example, land on a farm may be owned, rented, or partly owned and partly rented. In this report, all three tenure situations are represented.

\*U.S. GOVERNMENT PRINTING OFFICE: 1981-O-340-932/ESS-136